AMERICAN
DYESTUFF REPORTER

DEVOTED TO THE INTERESTS OF TEXTILE CHEMISTRY
• BLEACHING • DYEING • FINISHING • PRINTING •
AND THE NECESSARY MECHANICAL EQUIPMENT

"Circulated Everywhere Textiles Are Processed"

VOLUME XXV | JANUARY 27, 1936 | NUMBER 2

CONTENTS OF THIS ISSUE

Contents of previous issues can be found by consulting the Industrial Arts Index at your library

General Index

Spun Silk: Its Manufacture and Uses ..... 27.
By Noel D. White
Book Review 52

Index to Proceedings of American Association of Textile Chemists and Colorists

Fifteenth Annual Meeting
Annual Business Meeting P31
Saturday Afternoon Session P34
Comparative Tests for Value of Sulfur Trioxide in Different Amounts in Sulfonated Compounds ... P35
A paper by Albert H. Grimshaw
Conditioning Water for the Textile Industry P43
A paper by H. H. Morrison
Discussion on Accelerated Aging Test for Weighted Silk P49

Calendar of Coming Events P42
Notice to Manufacturers and Importers of Chemicals for the Textile Industry P42
Applicants for Membership P47
Ninety-Seventh Meeting, Research Committee P48
Banquet Held at Annual Meeting, Piedmont Section (Photo) P50

Editorial:

The S. O. M. A. 51

Official Publication of the American Association of Textile Chemists and Colorists

THE OBJECTS OF THIS ASSOCIATION ARE:

"To promote increase of knowledge of the application of dyes and chemicals in the Textile Industry.

"To encourage in any practicable ways research work on chemical processes and materials of importance to the Textile Industry.

"To establish for the members channels by which the interchange of professional knowledge among them may be increased."

Published Every Other Monday

HOWES PUBLISHING CO. ~ ~ 440 FOURTH AVE. ~ ~ NEW YORK

CLOSING DATE FOR ADVERTISING COPY . . . . . MONDAY PRECEDING ISSUANCE DATE

CALCONESE

Black

The Mode-of-the-hour expressed thru fibres of Acetate origin...and

COLOR MOTIFS

by

Calco

CALCONESE • COLORS •

THE CALCO CHEMICAL COMPANY • Inc.

• A Division of American Cyanamid Company

BOUND BROOK • NEW JERSEY

NEW YORK • BOSTON • PHILADELPHIA

PROVIDENCE • CHARLOTTE • CHICAGO

AMERICAN
DYESTUFF REPORTER

VOLUME XXV JANUARY 27, 1936 NUMBER 2

Spun Silk

Its Manufacture and Uses

By NOEL D. WHITE

Fig. 1—Weighing Bale of Pierced Cocoons (Italian).

SPUN silk manufacturing is an integral part of the silk industry and in spite of the intricacy of processing it, from the raw material to the finished thread, the many operations and the care involved in obtaining a high class product are very little known by its many users.

Considering the many uses to which spun silk may be adapted, not only in place of reeled silk, but also in mixtures with all the other fibers it is a remarkable fact that so little should really be known about the manufacturing and composition of such a versatile textile product.

Here is a flagrant illustration. Not long ago, while I was in charge of the dyeing for a ribbon mill, we ran into a lot of troubles through the carelessness of some warpers. They had mixed some spools of bleached cotton with spools of spun silk and had run them in the warps. In this mill they had found that in making up the warps for their narrow ribbons they could use in the selvage two threads of spun silk in place of 12 or more threads of singles raw silk, effecting a saving in the cost of the silk as well as in the price of twisting the new warps into the loom. When the mix-up occurred some of the ribbons came out of the dyeing with undyed edges and naturally when the imperfect dyeings were brought to my attention I knew at once what the trouble was. I proved it to them by stripping a few ends of the selvage and burning them. The cotton thread burns with a flame leaving a white ash, while the spun silk curls up into a brown bead emanating a smell of burning feathers. Just at that time a dyestuff salesman happened along to exhibit his wares and the superintendent thought he would get this man's opinion on how to correct and prevent a recurrence of that trouble. This man instead of telling him that the thing to do was to keep the spools of cotton secluded and prevent the warpers from putting cotton threads into an all silk warp, told him that that sort of thing was liable to happen in any mill and the way to stop damaged dyeings from that source was to dye the ribbons only with direct cotton colors which would dye the silk and cotton the same shade. He had a line of dyestuffs just for that purpose and would be glad to send us all we needed. My argument that some of our shades could not be dyed with only direct colors is beside the point. What convinced me that this man did not know what he was talking about was when he went on explaining how spun silk was made and what entered into it. He said that the spun silk manufacturers bought and used all the waste made in silk factories including the sweepings that every mill took up at night when closing down, regardless whether they had cotton lint, trimmings or anything else in it; it was all spun into the thread. That was the reason direct cotton dyes had to be used to insure even dyeings on spun silk.

I asked this man where he got such enlightening information. He assured us that "it was common knowledge". Against such assurance there was no use arguing. As I had charge of bleaching the spun silk for this mill from then on I tinted it, before delivering it, a pale blue with Indigotine, which is a fugitive color, easily discharged in the boil-off. We had no more trouble even if they did leave cotton spools around the shelves.

WHAT GOES INTO SPUN SILK

There are several sources of the waste silk that is used in the making of spun silk. Since no more than two-thirds of the cocoon filament can be unwound into reeled silk the other third is sold to the spun silk manufacturers. Then there are the cocoons that are kept to complete the cycle of the silk-worm. These are the best cocoons of the crop, which are selected for breeding and at the proper time, when the chrysalis passes into its winged state, they eat their way out of the cocoons as butterflies, mate and lay the eggs for the following season's culture. These perforated cocoons can not be unwound anymore and are

Fig. 2—Opening Bale of Frisons (Italian).

sold to make spun silk. The web-like structure spun by the silk-worm on the brushes where it climbs and anchors itself to weave the cocoon around his body is also gathered, baled and shipped to be spun into spun silk. All the raw silk waste made in the filatures, throwing plants, weaving and knitting mills is bought for the same purpose.

The greatest care must be exercised however in the selection of wastes and in the process of manufacturing. Everything is done that it is possible to do, in order to obtain an acceptable article, suitable for the numerous purposes for which spun silk is used in the textile industry and elsewhere. The thread must be spun evenly and free from all impurities and irregularities which may have found their way into the bale of silk waste.

Silk wastes come from various parts of the world and the bales (Fig. 1) coming from each country have their peculiarities and sources of trouble and grief. The mill waste from any country may contain waste mixed with other fibers than silk, or threads that have been twisted for crepe weaving. If these extraneous fibers are not removed a very uneven thread would result. Silk waste from China frequently contains hairs both human and animal that are the despair of spinners but to assert that anything is spun into spun silk is to give the industry a rather undeserved black eye.

PREPARING THE WASTE

It is quite important that the waste be thoroughly degummed first to remove the sericin and all other impurities that may be in it, accumulated dirt and dust and anything that may be baled in the waste. De-gumming may be done in vats or machines with soap or a good boil-off medium aided by some mild alkali. Having been in charge of the de-gumming room for a number of years in a spun silk factory I will describe how it was done in that mill.

On opening the bale the waste was weighed out in batches of 150 lbs. each. (Fig. 2). The frison, cocoons, broken skeins or whatever the waste might be, was put up into small sacks, one to one and a half pounds to the sack. All the waste, except the cocoons, was cut up over a sharp blade, fixed on a beam in a corner of the room, in short lengths four to five inches long. The cocoons were mixed up with the other waste.

The de-gumming bath was prepared in the vats with boiling water containing 15 per cent tallow soap, 1 per cent soda ash and 3 per cent sodium sulfite. The bagged waste was boiled in this bath for 40 minutes. Heat was provided by steam injected through two sets of pipes, fastened on the bottom of the vats. One set perforated the whole length served to heat the bath, the other with openings on the end of the pipes to promote circulation during the boiling. Following the first soap bath, the batch was boiled again for 40 minutes in another bath with 10 per cent soap and washed in hot water, then in cold water, taken out and whizzed in a hydro-extractor. Drying was done in a cyclone drier, a man on one end emptying the bags and spreading the silk onto the wire net of the drier and another man at the other end collecting the de-gummed and dried silk into a truck to be carried to the conditioning room.

Ours was an archaic way to prepare and de-gum the waste silk. Today there are machines in which the waste is placed without bagging and where it is de-gummed by circulating the suds under pressure, thus saving much time and labor, but the necessity of completely removing the impurities and the gum remains essentially the same.

Some waste is spun with most of the gum left on the silk. In this case instead of de-gumming at the boil to strip the sericin, the waste is soaked in a soap bath at 120 to 140 degrees F. for 48 hours or longer and then dried and spun. The resulting product is a thread with all the characteristics of silk with no luster and less strength called Chappe. Its uses have always been quite limited.

TAGGING THE WASTE

The silk waste we handled was of several kinds and variety, but it was classified in four divisions: Chinese, Japanese, Italian and Domestic. The domestic included all the waste coming from mills and factories other than the silk filatures. Here were found broken skeins and spoiled warps, silk stripped from half used spools, waste from the winders, warpers, throwsters, weavers, knitters and thread manufacturers. This waste, coming from the silk originally reeled from the cocoons, was the best for the production of long staple drafts and the most lustrous spun silk yarn. It was also the most troublesome. In this waste there were no cocoons to break up nor were the dull filaments of the web nor the flossy covering of the cocoon present but anything could be expected to be found mixed up with it, which contrary to the assertion from that friend of mine I mentioned above, was thoroughly and painstakingly eliminated before the silk reached the spinning machine. (Figs. 3, 4, 5, 6).

This waste was rigidly inspected before it was cut up to put into sacks to de-gum. If it contained any trace of cotton or other vegetable matter we used to add in the boil-off bath a few ounces of a direct cotton blue. The vegetable fiber would thereby acquire a blue tint and could be easily seen in the boiled-off waste. It was then distributed among the inspectors and the objectionable fibers

Fig. 3 (Above)—Frison Inspection.
Fig. 5 (Below)—Cocoon Inspection.

Fig. 4 (Above)—Dusting and Inspecting Pierced Cocoons.
Fig. 6 (Below)—Frison Inspection after Boiling.

picked out before the process was carried any further. In this waste there was also to be found crepe yarn and other highly twisted threads which caused a lot of troubles and worry to the spinners, because they could not be tinted and picked out so easily. Much of this would escape the most rigorous inspection and turn up in some woven or knitted fabric and be the cause of complaints when it was too late.

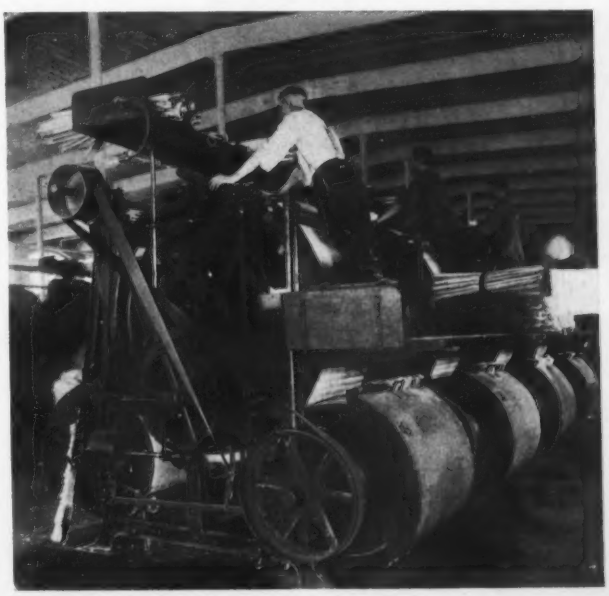
The several kinds of waste after they were de-gummed were stored in separate bins for conditioning before being made ready for dressing.

BLENDING OF THE FIBERS

The conditioned silk is next put on dressing machines (Fig. 7) where all the various wastes and cocoons are broken up, pulled apart, shredded and the fibers dressed by curved steel wires aligned and fastened upon large rubber aprons that cover huge drum frames. Here is where the blending of different wastes takes place, where they are thoroughly mixed to incorporate any quality desired in the spun silk.

Like blending several kind of grapes to obtain a brand of sherry wine with the desired bouquet, flavor and cheering power, different wastes are skillfully mixed with one another in various percentages of each, to obtain as near as possible a silk yarn suitable for any designated purpose. The Chinese silk, known for its strength is added for tenacity. Japanese waste is added to improve adhesion and color. The Italian and domestic wastes bring

Fig. 7—Dressing Frame.



to it fluffiness and brilliancy. Each kind of waste helps in some way to improve the final result with something it has that is lacking in the others. The percentage of each is weighed out, the whole is mixed up and is ready for the dressing machines.

In this as in all other phases of the processing it is very important that the proper humidity should be maintained. Before the mixture in the blend is fed to the dressing machine it is usually sprinkled with a solution of emulsified oil or glycerine to keep it in an hygroscopic condition to draw moisture from the surrounding atmosphere. However the room itself must be properly humidified or the work will proceed with difficulty.

One morning we had a dressing machine that stopped every few minutes. The operator could not keep it running steadily and finally sought the help of the machine fixer, who came and worked for some time on that machine without improving it. Disgusted, he started to leave it and tripped on a fire-bucket full of water that lay in his way. He gave it a vicious kick, spilling all the water under the machine and proceeded on his way out of the mill to ponder over the difficulty, while smoking a cigarette. When he returned he found everybody happy and the machine singing and running at its best. The spilled water under the machine had supplied the needed amount of moisture for the silk to run properly, where all the mechanical skill and efforts of the fixer had been of no avail.

The dressed laps before going through any more processing are again inspected to remove anything that may interfere with the production of a clean, even yarn. It is unrolled over a plate of glass, over the light produced by two or more powerful electric lights. Looking through the lap over the light, any piece of string, burr, crepe thread or anything else that may possibly mar the smoothness of the yarn, is carefully removed here and the lap is made ready for further operations.

PICKING THE DRAFTS

From the cleaned dressed lap several drafts of fibers are taken. The first draft containing the longest fibers is used for the finer counts of spun silk. From this the most lustrous, longest staple yarn is obtained. For making single thread yarns silk from the first draft is usually taken. Spun silk single is usually put on spools when ready and used as filling for silk and cotton warps. It is generally dyed after the goods have been manufactured. After the first draft has been picked out from the dressed silk a second picking of shorter fibers is drawn out which is called the second draft, with a staple fiber long enough for spinning a very good yarn in nearly as fine counts as the first draft. (Figs. 8, 9).

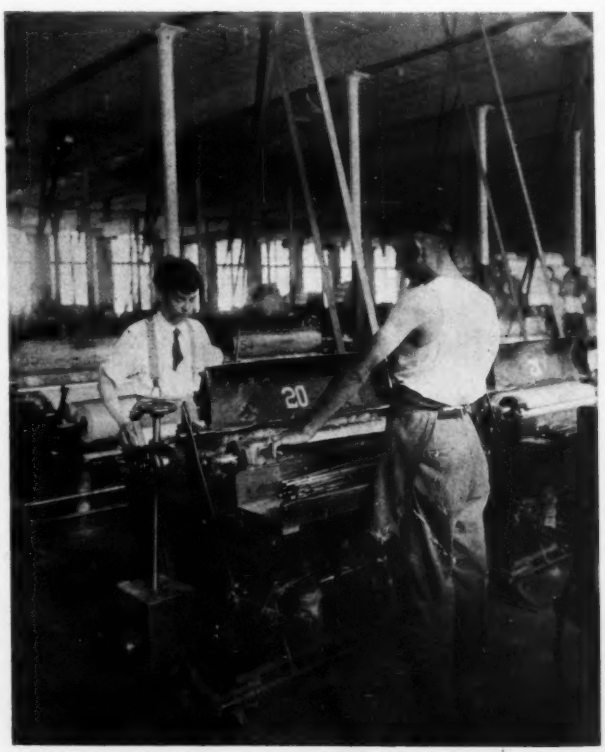
From the remaining dressed waste a third draft is then pulled out and finally a fourth, with the shortest staple, that can be used for coarse, thick yarn. What is left after this is used in spinning noil yarn and for mixing with wool to be used in the manufacture of blankets and dress materials.

Fig. 8—First Draft Picking.

In some cases mixtures of silk and cotton in various proportions are spun together into threads for knitting and other purposes. Yarn of this kind however is only prepared on commission and under given specifications and not for general use. (Figs. 10 and 11)

(*Continued on page* 53)

Fig. 9—Second Draft Picking.



PROCEEDINGS OF THE
American Association of Textile Chemists and Colorists

JANUARY 27, 1936

Officers of the Association

WILLIAM H. CADY, *President*
U. S. Finishing Co., Providence, R. I.

A. R. THOMPSON, Jr.—ELMER C. BERTOLET, *Vice-Presidents*

WILLIAM R. MOORHOUSE, *Treasurer*
National Aniline & Chemical Co., Boston, Mass.

HAROLD C. CHAPIN, *Secretary*
Lowell Textile Institute, Lowell, Mass.

LOUIS A. OLNEY
President Emeritus and Chairman of the Research Committee
Lowell Textile Institute, Lowell, Mass.

Councilors-at-Large

JOSEPH F. X. HAROLD — HAROLD M. CHASE
DONALD H. POWERS — ARTHUR E. HIRST
CARL Z. DRAVES — HENRY F. HERRMANN

Councilors Representing Sections

BEN VERITY (Rhode Island) — EUGENE C. KNAEBLE (Philadelphia)
HANS MEYER (New York) — B. C. BLOWNEY (Midwest)
ROLAND E. DERBY (N. New England) — G. H. DUBOIS (South Central)
CHARLES B. ORDWAY (South Eastern) — CHARLES H. STONE (Piedmont)

Local Sections and Their Officers

Northern New England Section
Roland E. Derby, Chairman, M. T. Stevens Co., No. Andover, Mass.
John N. Dalton, Secretary, Pacific Mills, Worsted Division, Lawrence. Mass.

Rhode Island Section
John G. Masson, Chairman, Rosemont Mill, Woonsocket, R. I.
Raymond A. Pingree, Secretary, 7 Sayles Ave., Saylesville, R. I.

New York Section
Ephraim Freedman, Chairman, Bureau of Standards, R. H. Macy & Co., Broadway and 34th St., New York, N. Y.
P. J. Kennedy, Secretary, E. I. duPont de Nemours & Co., Inc. 61 Thomas St., New York, N. Y.

Philadelphia Section
Robert E. Sullivan, Chairman, Anchor Thread Co., Groveville, N. J.
R. W. Delaney, Secretary, National Aniline & Chemical Co., 200 S. Front St., Philadelphia, Pa.

Piedmont Section
Chester L. Eddy, Chairman, Renfrew Bleachery, Traveler's Rest, S. C.
Raphael E. Rupp, Secretary, Pacific Mills, Lyman, S. C.

South Central Section
Walter E. Hadley, Chairman, Standard Coosa Thatcher Co., Chattanooga, Tenn.
Murray B. Smith, Secretary, Standard Coosa Thatcher Co., Chattanooga, Tenn.

Midwest Section
Arthur T. Brainerd, Chairman, Ciba Co., 325 W. Huron St., Chicago, Ill.
Elias A. Johnson, Secretary, National Aniline & Chemical Co., 357 W. Erie St., Chicago, Ill.

South-Eastern Section
C. A. Jones, Chairman, Georgia School of Technology, Atlanta, Ga.
W. F. Crayton, Secretary, Dimon Apt. Columbus, Ga.

Lowell Textile Institute Student Section
Herbert A. Wormwood, Chairman; Henry S. Anthony, Secretary

North Carolina State College Student Section
A. E. Shumate, Chairman; J. W. Furr, Secretary

Members should notify the **Secretary** immediately of all address changes

Annual Business Meeting
December 7, 1935

THE Business Meeting of the Association, held in the Ball Room of the Read House, Chattanooga, Tennessee, convened at twelve o'clock noon, Dr. Rose presiding.

President Rose: It is obviously necessary that every year we should have a business meeting and to that we shall turn our attention now.

The Secretary has a report to read.

SECRETARY'S REPORT
October 31, 1935

The membership of your Association again shows substantial growth. Below are listed the number of members and paid applicants of each classification, in each local Section, at the end of the fiscal year, the total for each Section, and for comparison the total for each a year ago.

	Active	Junior	Associate	Student	Total Oct. 31, 1935	Total a year ago
N. N. E.	227	29	16	1	273	247
R. I.	174	19	16	1	210	189
N. Y.	309	28	25	1	363	316
Phil.	208	24	26	6	264	204
Pied.	130	17	26	1	174	111
S. Cl.	38	4	3	—	45	39
S. E.	28	4	9	7	48	38
M. W.	94	6	8	—	108	100
L. T. I.	—	—	—	16	16	18
N. C.				17	17	4
No Section	36	7	4	—	47	33
Totals	1244	138	133	50	1565	1299
Corporate					28	25
Grand Total					1593	1324

Council meetings 98 to 102, and Research Committee meetings 91 to 95, reported in detail in the AMERICAN DYESTUFF REPORTER, were as follows:

New York, December 7, 1934.
Providence, January 25, 1935.
New York, March 1, 1935.
Washington, April 12, 1935.
Boston, June 14, 1935.

Respectfully submitted,

H. C. CHAPIN,
Secretary.

President Rose: You have heard the Secretary's report. . . . A motion to accept the Secretary's report was made, duly seconded, put to a vote and carried. . . .

President Rose: Unfortunately our Treasurer is not with us, but his report follows:

TREASURER'S REPORT
October 31, 1935

GENERAL FUND

Cash on hand—November 1, 1934		$7,139.63
Receipts—November 1, 1934 to October 31, 1935 inclusive:		
From Dr. H. C. Chapin, Sec'y	$9,873.19	
Interest on Time Deposit	113.68	9,986.87
		$17,126.50
Expenditures—November 1, 1934 to October 31, 1935 inclusive		5,813.18
Balance—October 31, 1935		$11,313.32

RESEARCH FUND

Cash on hand—November 1, 1934		$1,496.59
Receipts—November 1, 1934 to October 31, 1935 inclusive:		
From Dr. H. C. Chapin, Secretary	$1,673.00	
Textile Foundation	8,800.00	
Eavenson & Levering Company	500.00	
Chemical Foundation	400.00	11,373.00
		$12,869.59
Expenditures—November 1, 1934 to October 31, 1935 inclusive		9,575.56
Balance—October 31, 1935		$3,294.03

BANK BALANCE, OCTOBER 31, 1935

General Fund	$11,313.32
Research Fund	3,294.03
	$14,607.35
First National Bank of Boston—Time Deposit Account	$5,000.00
First National Bank of Boston—Checking Account	9,607.35
	$14,607.35

STATEMENT OF CASH POSITION

	General Fund	*Research Fund*	*Total*
Cash on hand—November 1, 1934	$7,139.63	$1,496.59	$8,636.22
Cash on hand—October 31, 1935	11,313.32	3,294.03	14,607.35

COMPARISON OF ACTUAL RECEIPTS AND EXPENDITURES IN TOTAL YEARS ENDING OCT. 31, 1934 AND OCT. 31, 1935

GENERAL FUND

	Year Ending Oct. 31, 1934	*Year Ending Oct. 31, 1935*
Total Receipts	$7,338.22	$9,986.87
Total Expenditures	5,595.21	5,813.18
Surplus	$1,743.01	$4,173.69
Additional Receipts for fiscal year ending October 31, 1933, but transmitted to Treasurer by Secretary after November 1, 1933, and included in Receipts for fiscal year ending October 31, 1934		$ 593.29
Additional Receipts for fiscal year ending October 31, 1934, but transmitted to Treasurer by Secretary after November 1, 1934, and not included in Receipts for fiscal year ending October 31, 1934		$ 415.53

ADJUSTED SURPLUS—GENERAL FUND

	Year Ending Oct. 31, 1934		*Year Ending Oct. 31, 1935*
Surplus as reported above	$1,743.01		$4,173.69
Additional Receipts October 31, 1933. Deduct	593.29		—
	$1,149.72		$4,173.69
Additional Receipts October 31, 1934. Add	415.53	Deduct	415.53
Adjusted Surplus	$1,565.25		$3,758.16

RESEARCH FUND

	Year Ending Oct. 31, 1934	*Year Ending Oct. 31, 1935*
Total Receipts	$7,939.00	$11,373.00
Total Expenditures	10,060.39	9,575.56
	Deficit $2,121.39	Surplus $1,797.44

Respectfully submitted,

W. R. MOORHOUSE,
Treasurer.

President Rose: There is another matter of importance that is to come up at this time. We have the amendments to the Constitution that have been brought before the Association.

AMENDMENTS TO THE CONSTITUTION

Secretary Chapin: There are two of these amendments. You have received copies of them, so I do not think it is necessary to re-read them in the meeting. The first of these amendments provides that members who are three months in arrears may be dropped for non-payment of dues, instead of permitting members to become six months in arrears. It does not seem to be good business to carry a man fifty per cent longer than he has paid for.

If anything were accomplished, it would be worth while to do it, but the feeling of many of us is that in six months a man merely forgets the obligation, and that we can remind him sufficiently in three months, so that if he wishes to pay his dues he can.

The second amendment has to do with the appointment of the Secretary by the Council rather than the election of the Secretary.

I have taken the liberty to speak about both of these. I asked Dr. Rose's permission beforehand, because it is largely business of the Association with which I am familiar.

The second provides that the Secretary be appointed by the Council instead of elected by the membership. There are two reasons for that. First, only the Council can be familiar with the duties of the Secretary and capable of selecting a suitable man to fill that position. The duties of that office have become rather specialized.

The second reason is that the worst possible time to change Secretaries is at the time of the Annual Meeting. I have had one experience of that sort, having taken over this office from another Secretary and I know that it is the worst possible time to change. The bills are out, the payments come to the former Secretary, who has to forward them to the new Secretary, and there are a great many other details of that nature.

Under the present Constitution, it is possible for a Secretary to resign in the summer-time, which is a slack period, of course; and that would be the proper thing to do, allowing the Council to re-appoint a successor, as it is empowered to do under the Constitution. Then, of course, the appointee would be elected at the Annual Meeting. It would seem better to make that a regular procedure.

President Rose: Is there any discussion at this time of these proposed amendments?

Dr. Carl Z. Draves: I move that these amendments be made and submitted to the membership by mail ballot.

. . . The motion was duly seconded. . . .

President Rose: It has been moved and seconded that these amendments be made and that they be submitted to the membership by mail ballot. Is there any further discussion?

. . . The motion was put to a vote and carried. . . .

President Rose: Is there anyone who wishes to bring up any other items of business at this meeting?

If not, the last item of business to come before us is the recording of the results of the ballot for officers for the ensuing year. However, before we have the results of the ballot, we have a report from the Research Committee as a matter of form, so that it may take its place in the proceedings.

REPORT OF THE RESEARCH COMMITTEE

Dr. Louis A. Olney: As some of you may remember, at the business meetings usually, we have had rather a long drawn-out report of the Research Committee and have called upon all the sub-committees to present their reports, but we thought it advisable to have this meeting as short as possible today. Therefore, I shall simply make one or two statements in the way of a summary to cover the report of our Committee.

We have had during the past year six meetings of the Research Committee. Two were held in Boston, one in Washington, one in New York, one in Providence, and one yesterday in Chattanooga.

We have twenty-five sub-committees that are actively working and three additional sub-committees have been authorized, which will be formed in the near future.

We now have six full-time research associates and five assistant workers.

We are at present working on five distinct research projects. One is on the chemistry of wool; another is on the quantitative separation of textile fibers; a third is on the determination of grease, oil, soap, and extraneous materials in textile materials; a fourth is on the study of vat dye printing paste, and the fifth is upon mercerization. Active work on mercerization is being done right here at the University of Chattanooga, as many of you know, and Mr. Edelstein, who is the active associate, is with us this morning.

A very important project, which will be worked out quite soon, is a cooperative piece of work to be carried out under the direction of the Throwsters Institute and our own Association. That work is being organized at the present time. An appropriation of $2,500 has been made by the Throwsters and another $2,500 by the Textile Foundation for the purpose of carrying this work along. It will be in connection with rayon and silk very largely.

The research project on the chemistry of wool has proved to be very important and very valuable and for some time we have been considering the formation of a similar committee on cotton, as soon as the work can be organized, and we hope that at least in a year from now, we shall have something very definite and valuable to report in regard to that. The committee takes this opportunity to express its appreciation of the cooperative sup-

port which has been given by the Textile Foundation, the Chemical Foundation, the Eavenson and Levering Co. and all of the corporate and sustaining members.

I think that covers in brief form the work of that Committee. We usually have a report of the Year Book Committee, which I can make even more brief this time.

President Rose: We shall call on you for a report of the Year Book Committee.

REPORT OF THE YEAR BOOK COMMITTEE

Dr. Olney: The Year Book Committee simply reports that the 1934 Year Book was published during the summer, and I believe was in the hands of practically all the members by September 1.

That seems like rather a late date, but if you have anything to do with the compilation of a book of this type, I think you will appreciate how long it takes to get all the different reports and various things in, to say nothing of the proof reading and so on.

The book has grown until at the present time there are approximately five hundred pages, and we are anticipatin publishing even a larger book this year. The cost of such a book, of course, will be proportionately greater but we have in mind that we can perhaps make it sufficiently attractive to induce more purchases, and also, perhaps, to make it more attractive for advertisers, who after all make the book possible.

I believe that is all.

President Rose: Now, we can go to the results of the ballot, and Dr. Chapin can tell you what Mr. Covington, who is Chairman of the committee counting the ballots, reports.

ELECTION RESULTS

Secretary Chapin: The ballots were forwarded by the Secretary and received sealed, by Mr. Covington, the Chairman of the Tellers' Committee in Chattanooga, who reports as follows:

There was no contest for the offices of President, Vice-President, Treasurer, or Secretary. He does not report the number of ballots received.

There was a contest for Councilors at Large, on which he reports 349 votes for Mr. Harold M. Chase, 295 votes for Mr. Arthur E. Hirst, and 202 votes for Mr. Alban Eavenson, making the accepted candidates Mr. Chase and Mr. Hirst.

President Rose: It is extremely unfortunate that Mr. Cady found himself unable to be here. He wrote me a note and said that he was suffering from too much work and sciatica, which is a combination that made it quite impossible for him to be here.

I think it would be nice if our Secretary sent him a telegram expressing to him our confidence in being under his leadership the next year and our very great regret that he is not here to take up his office.

If I may, before I actually pass the office on to my successor, I wish to express my very great happiness in having held the office of President for the time I have, and I want to make it clear that I feel it is the devoted band of those few who take a real interest in the Association who make the office of President worth holding and a source of real satisfaction. It is surprising what a lot of work these men do and how willingly and self-sacrificingly they do it.

I should also like to put on record, since I was in office the first part of this Convention, the Council's very great appreciation for the remarkable hospitality, successful business management, and the whole spirit of this Convention under the auspices of the South-Central Section. I feel that they have done a work which really is of great importance in this part of the country to the success of the Association and I should like to tell them so.

Would somebody like to make a motion that the Council wishes to go on record to that effect?

. . . The motion was made, duly seconded, put to a vote and carried. . . .

President Rose: The vote is unanimous.

In the absence of the incoming President, I assume that the Vice-President will act as President. Therefore, will Mr. Arthur Thompson take my place and allow me to step down and take my place as a member of the Association in good standing?

. . . Mr. Thompson assumed the Chair. . . .

Chairman Thompson: Is there any further business to be brought up before closing the meeting? All of the old business seems to have been attended to.

With this remark, I shall adjourn the meeting: Rather than assume the task of Dr. Rose in carrying on the afternoon program, I am going to ask Dr. Draves if he won't be good enough to finish the handiwork he has already started in arranging such a fine technical program, by assuming charge during the afternoon? You will hear enough from me tonight and I would rather be excused from the afternoon's program, if I may.

. . . The meeting adjourned at twelve-forty o'clock. . . .

SATURDAY AFTERNOON SESSION
December 7, 1935

The meeting convened at two-five o'clock, Dr. Carl Z. Draves presiding.

Chairman Draves: In the absence of Mr. Cady our President-elect, I have been asked to preside this afternoon.

The first paper is entitled, "Comparative Tests for Value of Sulfur Trioxide in Different Amounts in Sulfonated Oil," by Albert H. Grimshaw, of North Carolina State College. (Applause.)

. . . Professor Grimshaw presented his prepared paper. . . . (Applause.)

Proceedings of the American Association of Textile Chemists and Colorists

Comparative Tests for

Value of Sulfur Trioxide

In Different Amounts in Sulfonated Compounds*

By ALBERT H. GRIMSHAW†

THE subject of sulfonated compounds has been found to be of great interest to all branches of the textile industry. Naturally the uses of compounds in such a great industry are varied, no single compound could be expected to work equally well for each and every purpose. Regarding these uses, a few will be mentioned as discussed by various authorities.

Landoldt[1] wrote as follows: "The sulforicinates (sulfonated castor oil) are used throughout the wide field of the textile industry, i.e., in spinning, sizing, bleaching, dyeing, printing, and finishing. They are used not only as wetting agents but are also used for dyeing."

Quoting Estey:[2] "Sulfonated castor, and pine oils have long been recognized for their thorough wetting-out, and dye-assisting properties, and in the finishing of various classes of fabrics, as well as in kier boil practice sulfonated oils are unsurpassed. Sulfonated oils are used to a great extent in scouring yarn and cotton piece goods that are to be dyed in the grey, also in the printing paste made up in the color shop of print works to be used in printing as this oil will give penetration, and cause a greater depth of color in prints, making the white or other colored ground show up more prominently. Goods such as heavy duck, and drills that are to be dyed in the grey are made soft by running through an emulsion made of soda ash and sulfonated oil.

"As a matter of example the hosiery industry is compelled to knit the sheerest chiffons in ladies' hosiery, with reinforced heels, toes, and tops. To enable the lighter shades of dye to penetrate the seams and the tighter, heavier knit portions as well as the web-like silk in the leg, it is necessary to give the dye penetrating aid. Experience has taught the dyer that he must use a sulfonated oil free from excess of silicate of soda."

Mullin[3] in writing up various patents concerning the sulfonated compounds mentions the following: "Patent to A. Weiss states that textiles of all kinds may be sized by means of a product resulting from the sulfonation of a fatty material in the presence of a hydrocarbon, a gum, a resin, and a tannin."

British patent to H. T. Bohme states that "wetting power of liquids for washing and mercerizing is increased by addition of mixture of phenols and sulfonated oils."

Kelly[4] wrote fine articles in which he mentioned the dependability, versatility and adaptability of the compounds in softening, conditioning, and finishing of textiles. He stresses the ability of the compounds to go into solution with water alone and also their miscibility with various solvents.

In writing of various sulfonated compounds, Dr. Mosher[5] said: "Sulfonated tallow has been found decidedly useful as a cotton and a rayon softening and lubricating agent. Sulfonated castor oil is likewise superior as a base in the manufacture of various emulsifying compounds or bases which require the addition of solvents. Sulfonated neatsfoot oil has been used in silk throwing to supplant raw neatsfoot oil, also in the leather industry. Sulfonated olive oil is used in finishing silks and mixed goods. Improvement on the softness and resistance are imparted by high SO_3 contents. Glyceryl sulfates from any base have decidedly proven the value of organic SO_3, as a basis for softening and penetration baths."

In a paper presented last year to the A.O.C.S. by the author[6], a rather detailed account was given on the use of the compounds to the different fibers.

Pingree[7] has written one of the most interesting of descriptions of sulfonated compounds that has appeared recently, he says, "The major outlets for oils in the textile industry may be divided into three general classifications: first, in the preparation of yarn to improve its weaving, knitting or finishing qualities; second, in scouring, dyeing and printing to insure wetting, penetration and levelness; and third, for finishing the cloth to produce the desired appearance and feel, and consequently improve the 'merchandisability' of the fabric." Later on he says: "We

* Presented at Annual Meeting, Chattanooga, Tenn., Dec. 7, 1935.
† North Carolina State College.
[1]Wetting Out Agents, by A. Landolt; The Melliand, Vol. 1, Number 2.
[2]Sulfonated Oils Used in the Textile Industry, by A. C. Estey; Textile Colorist, August, 1932.
[3]The Sulfonated Oils, by Dr. C. E. Mullin; The Textile Colorist, Oct., 1931.
[4]Turkey Red Oil in Wet Finishing, by A. J. Kelley; Cotton, July, 1931.
[5]Dr. H. H. Mosher, Jersey City, N. J. Onyx Oil & Chemical Co.
[6]The Relation of Sulfonated Compounds to the Textile Industry, by Albert H. Grimshaw; Oil and Soap Journal, Jan., 1935.
[7]The Application of Soluble Oils in the Processing of Textiles, by Raymond A. Pingree; Oil and Soap Journal, August, 1935.

now come to what is by far the greatest outlet for sulfonated oils in the textile industry—that is, in the actual finishing of cloth. This is the last wet operation to which the cloth is subjected prior to its appearance on the market. Here are added to the cloth substances which enhance its appearance and feel, thereby increasing its 'salability.' Sulfonated oils or emulsified oils and waxes used for finishing are usually termed 'softeners,' although they are not always added to the cloth to impart that property. Softeners play a major role in the finishing process because, by their use, the finished appearance of a fabric may be varied between wide limits."

With the above great variety of uses in mind, it can clearly be realized that many varied properties are required of these compounds. Let us list some of them and some of the substances with which they would come in contact.

Likely the most important one is the action when diluted with water; here we want a compound that will go into solution in either cold or hot water, which will remain well dispersed and will not settle out. Also they must not lose their own peculiar property of wetting out, softening, levelling, etc. If the water is hard, containing magnesium or calcium salts, then the compound must not form any insoluble substances such as would be formed by soap.

They must resist alkalis such as used strong in mercerizing process, somewhat weaker in vat or sulfur dyeing, or somewhat milder in dyeing vegetable fibers with some direct dyes. Then again there is the case of alkali being used in kier solutions under pressure.

They will encounter acids such as sulfuric, acetic and formic when dyeing with some dyes on silk or wool. Then in many dye baths, there are the two commonly used assistants, sodium chloride and sodium sulfate, which come under the head of electrolytes. Goods might be after-treated with chrome and bluestone, then rinsed in a solution of one of the compounds. Such rinsings are also used to brighten up many dark colors such as sulfur blacks, and if the compounds cannot stand electrolytes or other substances of metallic nature, they would be of no use.

The compounds must not form sticky insoluble substances when mixed with starches, gums, dextrines, etc., in products used in slashing or in finishing.

An important property which should be mentioned in regard to dyeing is that they should be able to so retard the dyeing that you get level results.

In helping to make the printing pastes, they must not react unfavorably with any of the mordants used.

If used as assistants in scouring cotton, they must be able to soften the waxy or pectin matter; with wool they must be able to help remove the large amount of grease if the wool is in the raw state, or the oils often sprayed on if the wool is in the yarn or woven state; with silk they must be able to soften the sericin or to help carry the substances used to soften the sericin; with rayons they should be able to emulsify the mineral oils which so often are present.

In finishing of silk hosiery, some compounds are sometimes used for spot or water-proofing which would immediately precipitate many other substances, but the sulfonated compounds must be so chosen that they will not even cause any separation.

Must be miscible without any reaction with the many finishing compounds on the markets, some of which may contain inorganic or organic salts and solvents.

They must be able to remain on the fabric and continue to impart the desired finish without ever becoming rancid or odor-forming. There are any number of other qualities that are desirable that likely come to the mind of the reader, but time will not permit to enumerate them.

Now what gives these desirable qualities? Is it the organically combined SO_3 or is it the fatty matter? Opinions seem to differ, but one or two will be quoted here. Referring to Dr. Mosher's[5] statement, "Improvement on softness and resistance are imparted by high SO_3 contents." Quoting from an advertisement: "Importance of SO_3 content: the vital element in sulfonated compounds is the organically combined SO_3 content. The higher the SO_3 content, the greater the resistance to heat, alkalis, acids, etc." Quoting from a report by Hart[8] of a conference of manufacturers of sulfonated oils a few years ago: "There were many who favored grading the oils according to the concentration of fatty matter determined by one of the available extraction methods. This was opposed by others who claimed that it did not take into consideration the organically combined SO_3, an active ingredient which is claimed to be at least as important as the fatty matter and should therefore be included with it." NOTE: Since that time, more work has been done on the grading subject or problem by one of our own committees. In one of the reports, we find these substances mentioned in Average Specifications of Basic Grades of Sulfonated Oils; i.e., Fatty Matter, Neutralized Combined Organic SO_3, and Alkali; these are added together to form the Total Active Ingredients. Note that the SO_3 is included. Quoting Dr. Stadlinger[9]: "the sulfuric acid residue is the reason for the stability against acids and hardness."

Pingree[7] mentioned as follows: "Oils which are used for oiling, sizing and soaking operations do not come in contact with electrolytes of any type and, consequently, are not required to be highly sulfonated." Later he mentions that highly sulfonated oils are used in dyeing. Then again he states: "The only oils used to any extent in acetate silk finishings are highly sulfonated olive and castor oils, etc." Then again: "In silk finishing large amounts of soluble heavy metal salts are used for adding weight to

[8]Specifications for Grading Sulfonated Oils, by Ralph Hart; American Dyestuff Reporter, January 4, 1932.

[9]The Importance of Sulfonated Fatty Alcohols in the Textile Industry, by Dr. Herman Stadlinger; The Melliand, Oct., 1932.

the fabric. These salts would quickly precipitate most of the ordinary sulfonated or emulsified oils on the market. For this reason, it is necessary to use highly sulfonated oils which are resistant to the actions of these compounds."

Just a word or two or three concerning sulfonated oils from A.A.T.C.C. Committee Report No. 2. "Sulfonated oils are structurally distinguished from soaps by their contents of organically combined sulfuric anhydride, which may be combined with the fatty matter either as a sulfuric acid ester (sulfated oil) or as a sulfonic acid (true sulfonated oil). The SO_3 in the true sulfonated oil is linked directly to the carbon atom, thus R—C—SO_3Na, where R represents the fatty radical; in the sulfated oil, it is connected to the fatty matter by an atom of oxygen, thus, R—O—SO_3Na. The sulfuric acid ester or sulfated oil is readily decomposed upon boiling with mineral acids, liberating free sulfuric acid, whereas the sulfonic compound remains stable under the same conditions." Note that this may have some bearing on some of the tests.

Referring once more to Pingree, we find the statement: "The resulting sulfonated oil may contain from 0.5 per cent to 20.0 per cent of organically combined sulfur trioxide, from 5.0 per cent to 90.0 per cent of free fatty acids, and from 0.5 per cent to 9.0 per cent of combined alkali (Na_2O)."

With these wide limits in mind, we thought that it might be good experience for some of our students to try to make up in our laboratories some sulfonated oils of various strengths of SO_3 and fatty acid contents. It must be admitted that such tests were failures and at this point, let us suggest that you do not try any such tests unless you get the advice of an expert sulfonated oil maker, and also that you have plenty of proper equipment. In these days of keen competition, you will find that the manufacturers have spent thousands of dollars in securing special apparatus for refrigeration, time and other control, as well as in developing new and better formula for the making of sulfonated compounds.

Having failed to make proper samples in our own lab, we were fortunate in having donations of analyzed samples given to us through the kindness of Onyx Oil & Chemical Co.

Eight different samples were given to us, but for the purpose of this paper, only five will be mentioned. They will be called by letter from now on. A contained 50 per cent fat and 8.5 per cent SO_3; B contained 50 per cent fat and 5.5 per cent SO_3; G contained 47 per cent fat and 6.8 per cent SO_3; H contained 47 per cent fat and 4.9 per cent SO_3; F contained 68 per cent fat and 5.44 per cent SO_3. Results will try to compare these samples on equal fat basis when feasible, although F will be used for contrast at times along with D and E which contained respectively 63 per cent and 65 per cent fat and 6.3 per cent SO_3 and 5.8 per cent SO_3.

Students did this testing and checks were made in most cases. Some tests were omitted in these results because they did not check. More time is needed to secure data on others.

TESTS

Mixture was made using .2 gram powdered indigo (vat dye) per 100 cc. of solution containing 1 gram of samples per 100 cc. Put 400 cc. of the mixture in pint bottle and read printed paper through the solution by holding a strong light in back of the paper. The bottles were shaken and attempt at reading made at once, then in six hours, twenty-four and seventy hours. The attempt with .2 gram of indigo was not successful so another set was made containing .1 gram indigo per 100 cc. (Table I.)

We also tried powdered charcoal, but was not any good as the charcoal settled in all cases and the mixture cleared up too quickly to give any value to reading test.

Using Ponsol Jade Green with the bottle test. In this test we found that 1.2 grams of the powdered dye gave best results. (Table II.)

Tried the bottle method using Cibacet powdered dye of the acetate type. This color was so strong that we could not read the printed matter with the strong light behind it when mixtures were made. Diluted one-half and even then could not read. After two days, all the mixtures including the water alone, would not allow of the reading of the printed matter.

Tried another method using another acetate dye, Celanthrene Orange. Used a small hand whiz and placed dye mixture in the tube with 1 cc. of 1 to 10 oil sample and whizzed 30 times. Even before whizzing, small amounts of the dye would settle in each case, but not enough to be measured. (Table III.)

Here we found that there was but slight difference with A being slightly better than B; G slightly better than H; and D than E.

STABILITY WITH HYDROCHLORIC ACID

First method tried. Put 50 cc. of 1 to 10 oil sample in 100 cc. glass stoppered graduate, then added hydrochloric acid made up 1 to 10 in 5 cc. portions, shaking well each time, and allowing to stand. Results on 4 samples only. Acid cleared up all solution to some extent, when using 10 cc. of the acid. A foams; B foams and settles quickly as does C; D has small amount of foam which disappears quickly. With 15 cc. of acid, turbidity in B, G and H, but A remains clear. After two hours, B plus 15 cc. of acid had top layer of oily substance. Reduced the amount of acid but B still broke. With 20 cc. of acid, A and G broke. With 25 cc. of acid, H broke. Then allowed to stand overnight; H had a clear oily layer on top; G had a light clear yellow layer at the *bottom,* turbid layer above. With this data as a starter, another test was decided upon using the Babcock cream separator.

TABLE I
Results

Sample. Water no oil.	*When made. Can read.*	*After 6 hours. Slight settling.*	*After 24. Sediment.*	*After 72. Sediment more.*
A	Cannot read.	Cannot read.	Can read.	
B	Cannot read.	Cannot read.	Cannot read.	Can read.
D	Cannot.	Cannot.	Cannot.	Cannot.
E	Can barely read.	Same.	Same.	Can read.
F	Cannot.	Cannot.	Can.	
G	Can read.			
H	Cannot.	Can barely read.		

NOTE: Slight color changes. Compare A with B; G with H for equal fat value, but different SO_3 value. This test was for dispersion.

TABLE II
Results

Sample. Water.	*First made. Read slightly.*	*After 1 day. Can read. Sediment.*	*After 2 days. Easily read. Much sediment.*
A	Cannot read.	Cannot read. Slight sediment.	Read slightly.
B	Cannot read.	Cannot read.	Cannot read. Slight sediment.
D	Cannot read.	Cannot read.	Cannot read. Sediment.
E	Read slightly.	Can read.	Less sediment than water.
F	Cannot read.	Cannot read.	Cannot read. Very little sediment.
G	Cannot read.	Can read.	Read easily. Less sediment than water.
H	Cannot read.	Read slightly.	Read slightly. Some sediment.

NOTE: Compare these as in indigo test.

TABLE III
Results

Sample. Water.	*Just after whizzing. Cleared up, sediment.*	*After standing 24 hours. Clear at top of tube, but small amount of dye sticking to the lower sloping sides of the tube.*
A	Like the water test but had more dye left in suspension.	
B	Some suspension, but also plenty of sediment.	
D	Some suspension, but also plenty of sediment.	Lots of dye on sloping sides.
E	Acts like the water.	
F	Held fairly well.	Some sediment, etc.
G	Held very well.	Resembles A.

TABLE IV
Results of Babcock Test with Hydrochloric Acid

Sample.	*After 2 minutes.*	*After 24 hours.*	*48 hours.*	*96 hours.*
A	Clear.	Very finely dispersed matter. No oil, layer.	No oil layer.	No oil.
B	Turbid or milky.	.3 cc. brownish top layer oil.	.5 cc. oil.	More oil.
D	Milky white turbidity.	Spongy separation white, but no oil layer.	Same, no oil layer.	Floc. ppt. No oil.
E	Clear.	No separation.	Thick cloudy floating substance.	.6 cc. of oil layer.
F	Cloudy.	2 layers, upper ½ cc. clear oil. Lower turbid.	3 layers. Upper 5 cc. oil.	Bad.
G	Clear light yellow sol.	No separation.	.3 cc. top oil layer.	.4 cc. oil.
H	.5 cc. oil top layer.	.7 cc. oil.	.8 cc. oil.	Oil and some suspended matter.

NOTE: Comparing the 50 per cent basis fat samples, A better than B; on 47 per cent fat, G better than H; on other basis of higher per cent fat, D and E both better than F.

TABLE V
Results of Babcock Test Using Sulfuric Acid

Sample.	*Without acid.*	*1 cc. acid. 2 cc. acid.*	*4 cc. acid.*	*After 24 hours.*
A	Clear yellow.	No change apparent.		Clear, small top layer opaque oil.
B	Milky white.	No change apparent.		3 cc. oily top layer. Also scattered spots.
D	Rusty semi-clear.	No change.	Separates.	3 layers.
E	Clear with bluish tinge.	No change.	Separates.	2 layers.
F	Milky white	No change.	Separates.	3 layers.
G	Clear yellow.	No change apparent.		.2 cc. oil.
H	Light milky white.	Separates easily. ½ cc. of acid caused first separation.		

NOTE: A better than B; G much better than H; D, E and F not so much difference when compared with each other.

TABLE VI
Results

Sample.		*First added.*	*After standing 24 hours.*
A	With 5 cc.	No change.	Few white particles on top.
B		Slight scum.	.5 cc. oily top layer.
D	Used only 4 cc.	Fine floating particles gradually ppt.	Flocculent ppt. throughout.
E		No change.	Clear.
F	Fine white ppt.		Fine ppt. throughout.
G		No change.	Still very clear.
H		.3 cc. oily top layer.	Clear oil top layer.

NOTE: A better than B; G better than H; E better than F. 5 cc. of acid was used in each case excepting D.

TABLE VII
Results

Sample.	*As is.*	*1st 5 cc.*	*2nd 5 cc.*	*3rd 5 cc.*	*4th 5 cc.*	*5th 5 cc.*
A	Clear.	Very foamy.	More foam. Broke 500″.	Broke 15′.	Broke 17′.	Broke 15′.
B	Opaque.	Very foamy.	Broke 720″.	Broke 16′.	Broke 17′.	Broke 15′.
D	Creamy opaque.	Good foam. Turbid.	Same.	Same.	Same.	Very opaque.
E	Clear transparent.	Good foam. Slightly turbid.	Same.	Foam holds better	Foam good.	Same, no sediment.
F	Creamy opaque.	Turbid.	Good foam.	Loses foam quickly.	Same.	Opaque again.
G	Fairly clear.	Good foam.	Broke 190″.	Broke 16′.	Broke 16′.	Broke 15′.
H	Turbid.	No foam.	No foam.	Foams for first time.	Broke 195″. Sticky foam clearing up from bottom.	

STABILITY BY BABCOCK METHOD

In this method, 47½ cc. of oil samples made up 1 to 10 was placed in the Babcock bottle with the graduated neck, then 3 cc. of hydrochloric acid 1 to 10 was added, the bottles placed in the separator and whizzed for two minutes at 80 r.p.m. Then taken out and examined at once, again in twenty-four hours, forty-eight hours, and ninety-six hours. By using the Babcock bottles in the Babcock cream separator, it is possible to determine small amounts of any light separation which floats to the top. The Babcock bottles having narrow necks which are graduated in some case to one-tenth of a cc. (Table IV.)

STABILITY BY BABCOCK WITH SULFURIC ACID

Used the Babcock bottles as in the hydrochloric acid test; put 47½ cc. of the samples made up 1 to 10 and then added 1 cc. at a time of sulfuric acid made up 1 to 10; whizzed for two minutes and noted any changes that took place after standing for several minutes. Then allowed to stand for 24 hours after the fourth cc. had been added and made observations. There was no difference with the 3 cc. addition and 4 cc. addition excepting in the case of B, so the 3 cc. addition is omitted in the table. (Table V.)

STABILITY WITH BABCOCK WITH ACETIC ACID

Used the 30 per cent acetic acid made up 1 to 10; whizzed two minutes 80 r.p.m. and examined after addition of each 1 cc. of acid. (Table VI.)

ALKALI TEST

In this test we tried to pair off the samples having the same or nearly the same fat contents. Procedure: put 50 cc. of the oil sample in a glass stoppered graduate, and added caustic soda solution made up 1 to 10 in 5 cc. portions, shook, allowed to stand and made observations. (Table VII.)

NOTE: Comparing A with B; after 3 days settling, A showed a heavy yellow liquid substance settled at the bottom, and 1 cc. separated matter at the top, rest of mixture was clear. B was clear with a 5 cc. on top. Both foamed when shaken. Comparing D, E and F; after standing 1 day, D has top layer 1.5 cc. of white floating substance. Balance cloudy. E very clear, others cloudy. F has 2 cc. top layer, rest clear excepting for very fine suspended particles. After standing 2 days; D has 8 cc. white top layer; E is very clear; F has 25 cc. top layer, rest is clear. We rated E the best of these three with D next. Comparing G with H; after three days; G has 5 cc. white upper layer, rest of mixture is clear. H has 14 cc. white upper layer.

STABILITY OF COMMON SALT

Procedure: Put 50 cc. of the samples made up 1 to 10 in a glass stoppered graduate, then added 1 cc. at a time sodium chloride solution made up 1 to 5; allowed to stand and made observations as to when separation took place. Comparison made on same or as nearly the same fat basis as possible.

Results

A required 13 cc. of the salt solution or approximately 52 per cent on the actual weight of the oil used; B required 9 cc. or about 36 per cent. G required 24 cc. or about 96 per cent; H required 9 cc. or about 36 per cent. D required 17 cc. or about 64 per cent; E required 14 cc. or about 56 per cent; F required only 3 cc. or about 12 per cent.

STABILITY WITH HARD WATER USING CALCIUM CHLORIDE

Two tests were tried as the first one was not very successful. In the first test, a solution of calcium chloride containing .001 gram per cc. was used as follows: 50 cc. of tap water, 10 cc. of the calcium chloride solution and a little soap solution. Naturally when shaken, there was no foam; an effort was made to cause the solution to foam by adding some of the oil samples a few cc. at a time, used 1 to 10 dilution of the samples. Tried a couple of the samples without obtaining any foam and decided to try to find a better way of testing. Second test: put 50 cc. of 1 to 10 samples in shaking graduate and gradually added some calcium chloride solution. 15 cc. was used for all excepting A which was found to withstand 25 cc.

Results

A—when the calcium chloride was first added, the mixture became cloudy but cleared up on shaking. When 25 cc. had been added, the mixture was allowed to stand overnight and a very fine white ppt. was formed.

B with 15 cc. of calcium chloride solution and on standing for three hours separated into three layers.

D after three hours had a 4 cc. oily looking deposit on the *bottom* of the graduate; after two days, this increased to about 20 cc.

E acted like D.

F acted like D at first, but in two days the lower layer had floated to the top.

G with 15 cc. of calcium chloride solution after three hours standing had a layer on the bottom of oily looking substance. H, after three hours formed a layer of white flocks on top with the lower part of the mixture remaining clear.

NOTE: Without doubt, A reacted better than all of the others. Compare A with B; G with H; and D, E and F for same or nearly same fat basis. Another test which was not run at this time, but which likely would give more conclusive results would be to use the Drave's method and calcium chloride solution.

SOME OF THE DYEING TESTS TRIED

Some 150 denier acetate yarn and some 150 denier viscose yarn were knitted into tubing and dyed without scouring. This was done to try to see if the addition of the samples tended to make more level dyeing. Blanks were run in all cases without using any of the oil samples. Dyeings were also made on unscoured cotton yarns.

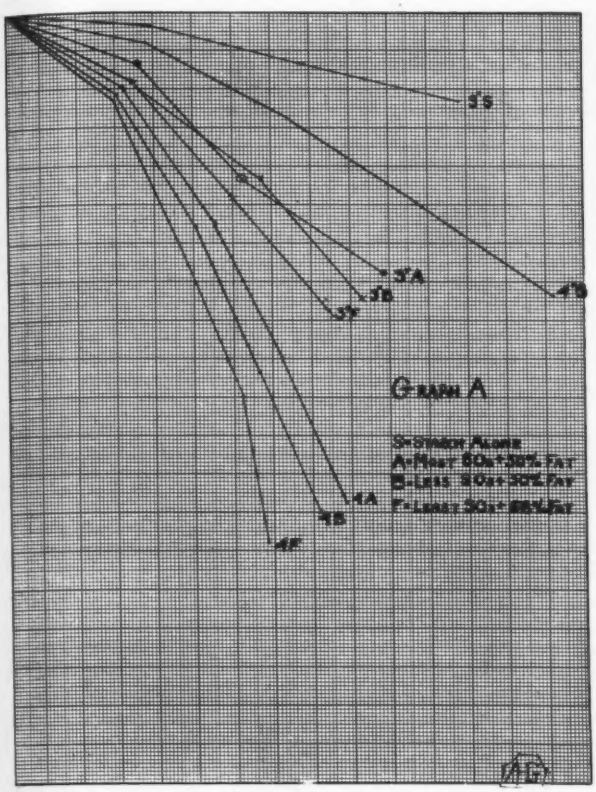
A great many dyeings were made and then more of the same for checking purposes. Space will not permit to go into details of these tests, but it will be mentioned that a great deal of work can be done along these lines in trying to determine tests which will show accurately the difference due to varying amounts of SO_3 or fatty acid.

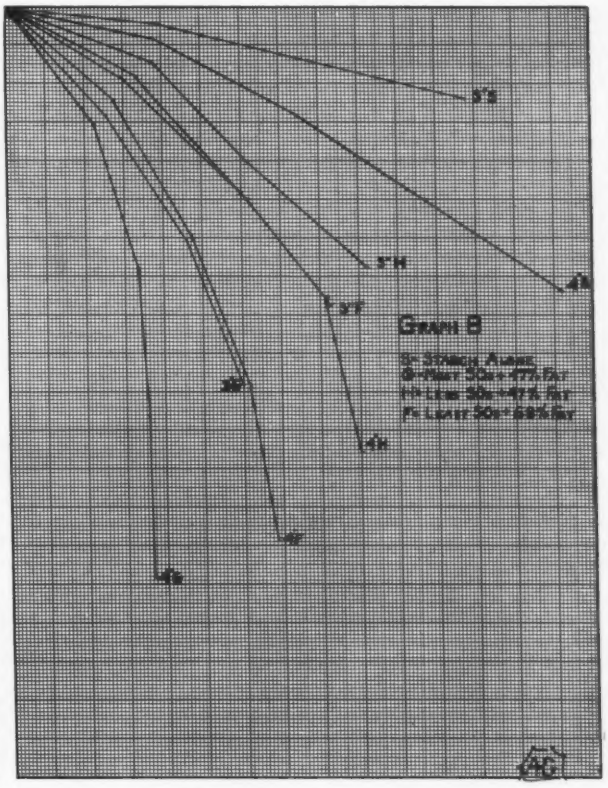
Test No. 1: 1 per cent direct dye, 1 per cent oil sample on viscose knit goods, without use of salt. All dyeings came out with the oiled samples slightly lighter than the sample without oil. All treated goods were softer. A and B gave nice level dyeing. H was better than G.

Test No. 2: The first test was repeated on the viscose using 10 per cent common salt. Slight difference in shade of treated goods when compared with sample without oil. B better than A; H better than G. All treated samples appeared slightly brighter.

Test No. 3: Direct dye on cotton skeins. Treated were slightly lighter in shade than the untreated skein. B better than A; G softer than H.

Test No. 4: 5 per cent vat dye on cotton skeins. A and B were brighter, softer and darker than the untreated skein. G felt good and was better than H.





Test No. 5: Vat dye on viscose yarn knit goods. Treated samples were even, untreated was uneven.

Test No. 6: S.R.A. dye on acetate yarn knit goods. Untreated was uneven, but most of the treated were fairly even. A better than B.

NOTE: Many more dyeings were made but data has not been compiled as the method of examining was to have as many students as possible look over the samples and compare them with the untreated sample, then list the dyed samples in order as to feel (appearance), etc. Much more work should be done along these lines and possibly will be used by some of the students later on as a thesis.

FINISHED TESTS ON DYED SKEINS

At the school, all of the dyeing is done on skeins which then go to the weaving department. The dyeing is done on a Smith Drum single arm machine, using mostly vat colors, but occasionally using diazotized colors. Some skeins that had been dyed were after-treated with the oil solutions made up on an equal fat basis. The skeins were immersed in the hot solutions, then squeezed and dried. They were then examined and classified by six students as to appearance, feel and any change in color. Three vat-dyed types were used and two of them diazotized and developed. No distinct advantage was given to any particular sample of oil, but in all cases, the reports said that the treated skeins were softer, brighter and in some cases a trifle darker.

EFFECT OF THE OILS ON STIFFNESS PROPERTIES

Using the method described by the author in *Rayon-Melliand* of September, 1935, strips of sized cotton cloth were prepared from cornstarch paste containing oil from the samples. The amount of bend in these strips, when held so that three and four inches extended from the clips, were plotted and are shown in Graphs A and B. On Graph A are shown the comparative curves of cloth treated with starch alone, with starch plus sample A and B of 50 per cent fat basis, and with starch plus F on 68 per cent fat basis. The starch alone shows much stiffer than the others, while the F shows the least stiffness; A and B curves running between the other two. In Graph B, note that again starch is the stiffest of the curves; G and H are of 47 per cent fat basis with H curves lying between starch and F, but G having in this case the least stiffness. SO_3 comparison can also be made on same fat basis.

WETTING-OUT TESTS

These tests were made using the method of Draves as described in the Year Book of the A.A.T.C.C., and also by the Rosette method as described by the author in the *Melliand* of April, 1933. Samples of the oil used were made up 1 to 100. Following are the comparative results

on the same or as nearly the same fat basis as possible, with the SO_3 contents varying.

Sample.	Ave. sinking time in seconds. Draves, 22 degrees C.	Rosette 22 degrees C.	Rosette 70 C.
A	27.92″	64.1″	40.52″
B	80.24″	293.8″	197.2″
D	35.96″	125.7″	57.52″
E	61.08″	252.6″	70.2″
F	68.36″	600 plus″	83.34″
G	48.76″	253″	83.″
H	75.52″	Did not sink in either.	
		Wet out 38.6″	4.8″

It would be fine if more tests could be carried out using the Draves' method and having the samples tried as to wetting-out properties when used with various acids, salts, alkalis, etc.

EMULSION TEST

For this test, the one mentioned by Pingree[7] was used. Procedure: On an equal fat basis using F samples (68 per cent fat) as a standard, required amounts of the oil samples were placed in dyecups and enough boiling water added to make 200 cc., then boiled for 5 minutes and set aside. Examined after two hours and again in twenty-four hours. Call this test A. The other test was to add cold instead of boiling water and bring to a boil, call this test B.

Results of Pingree Emulsion Test

Sample.	After 2 hours.	After 24 hours.
Test A (Boiling water)		
A	Clear yellow.	Clear yellowish brown.
B	Good.	Dish water color, fair.
D	Good.	Good, milky white.
E	Slightly turbid.	Clear, almost colorless.
F	Slightly turbid.	Very clear, almost colorless.
G	Very clear.	Clear, almost colorless.
H	Good emulsion.	Good, white emulsion.
Test B (Cold water)		
A	Clear yellow.	Clear yellow.
B	Good emulsion.	Good milky white.
D	Slight separation.	Slight separation.
E	Slightly turbid.	Turbid, but not opaque.
F	Very turbid.	Small fine particles in suspension.
G	Clear yellow.	Clear yellow.
H	Slight separation.	Slight separation.

NOTE: The boiling method tends to give slightly better results.

Conclusions: A study of the various tests shows that much more work must be done to secure more and better methods of comparing the values of such compounds. From the ones mentioned here, it would seem to incline toward the claims that oils of equal fat value made in modern plants by skilled chemists where control is always used, in many cases are of more value if the SO_3 contents are greater.

The author would be pleased to have criticisms of the tests or the results sent to him at the college.

DISCUSSION

Chairman Draves: Sulfonated oils are so universally used in the textile industry that I am sure we are interested in hearing Professor Grimshaw's remarks about the properties of those compounds. I think it would be interesting, for instance, in considering stability toward various things to note the effect of pH on the reaction of solution, and the effect of the emulsion-breaking substance. For example, if you were studying the stability toward calcium chloride, probably slight changes in pH would affect that stability very greatly.

CALENDAR OF COMING EVENTS

Annual Meeting, Midwest Sec., Schroeder Hotel, Milwaukee, Wisconsin, February 8, 1936. Speaker: Howard A. Marple, E. H. Sargent & Co. "The Electrometric Method of pH Control."

* * *

Meeting, Philadelphia Section, February 28, 1936, Broadwood Hotel, Philadelphia.

* * *

Meeting, New York Section, Alexander Hamilton Hotel, Paterson, N. J., Friday, January 31, 1936.

* * *

Annual Meeting Providence, R. I., December 4 and 5, 1936.

NOTICE TO MANUFACTURERS AND IMPORTERS OF CHEMICALS FOR THE TEXTILE INDUSTRY

(Reprinted from January 13, 1936, issue)

IN THE 1933 Year Book of the American Association of Textile Chemists and Colorists there appeared for the first time an Alphabetical List of Textile Chemical Specialties. Now material is being collected for the same list for the 1935 Year Book. Those manufacturers and importers who have not yet participated in this work of the Association are invited to assist us in publishing this year a larger, more complete and more useful list of the chemical specialties which are available in America for the textile trade. If you have products which should be included in the list and if you have not already been canvassed, write at once to the chairman with the information asked for on page 316 of the 1934 Year Book.

CARL Z. DRAVES, *Chairman,*
Committee for Textile Chemical Specialties, 273 Converse Street, Longmeadow, Mass.

Proceedings of the American Association of Textile Chemists and Colorists

Conditioning Water

For the Textile Industry*

By H. H. MORRISON†

THE water supply for textile processing should be clear, colorless and free from harmful impurities. Unfortunately, such water supplies are seldom, if ever, found in nature. Instead, practically all natural water supplies contain impurities which cause processing difficulties. Naturally, these difficulties vary in degree, depending on the nature and amounts of the impurities present in the water supply and the particular processing that is to be carried out. They may be slight; they may be extremely serious; or they may be at any point between these two extremes.

In many cases, even in the same mill, certain impurities may exert little, if any, harmful effect in one type of wet processing and yet be extremely harmful in another type of processing. Frequently, also, the source is not obvious and everything else is blamed for processing difficulties actually caused by impurities in the water supply.

Probably there is not a single textile man who has not seen sporadic cases of processing difficulties. Often these come on suddenly and somewhat mysteriously; everything goes wrong for a time and then, almost as suddenly, things go back to normal again. Such processing troubles are often caused by a water supply of variable composition. A seasonal change, a drought, a sudden freshet, or the spring or fall turnover of a lake, pond or reservoir may entirely change the composition of the water supply and this change in composition is often responsible and seldom blamed for these processing difficulties.

Whatever the defects of a natural water supply may be, these can be cured by correct treatment. This may embrace one or a combination of several processes, such as sedimentation, coagulation, settling, clarification, color removal, iron removal, manganese removal, water softening, etc. Such processes are known collectively as "water conditioning" and this paper will sketch briefly, the processes and equipment employed in conditioning water for the textile industry.

SEDIMENTATION

If the water supply is drawn from a swiftly flowing stream which is heavily charged with coarse sediment, it may be advisable to settle out this sediment in sedimentation basins, before applying other treatments. On the other hand, if the sediment is not exceedingly heavy and abundant, this step can be omitted and the coarser sediment can be removed, together with the finer suspensions, in the settling process which will be described later.

Where sedimentation is practiced, it is carried out by allowing the water to flow slowly through a sedimentation basin or, where available, a reservoir. Depending on the size of the particles to be settled out, the period of detention may vary from a few hours, in a comparatively small baffled basin up to possibly a month or more, if a large reservoir is available.

Usually, no chemical treatment is applied and the sedimentation is purely physical. Where algae growths are encountered, the water may be periodically treated with copper sulfate or the growths may be killed with chlorine.

As the size, design, detention period, etc. would vary greatly, depending on local conditions and requirements, a detailed description of a settling basin will be omitted. All that is required is a sufficiently slow flow of the water so that a satisfactory degree of sedimentation may be obtained. Where basins are employed, they should be properly baffled so that short circuiting is avoided.

COAGULATION

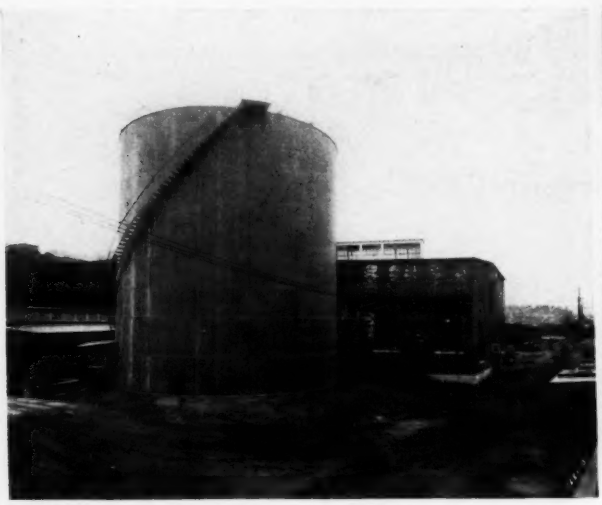
In addition to coarse sediments, surface water supplies frequently contain very finely divided suspensions, which may range down to colloidal dimensions. These settle so slowly and imperfectly that a chemical treatment is usually required. The chemicals employed are usually either aluminum or iron salts. These are known as coagulants and the process as coagulation.

The coagulant reacts, either with the alkalinity present in the water or, if this is insufficient in amount, with added alkalinity, usually obtained by the addition of soda-ash, to produce a gelatinous precipitate, known as a "floc". When produced under correct conditions, this gelatinous floc gathers together the finely suspended matter into comparatively large, coarse, flakes which may then be removed by settling or filtration or a combination of both.

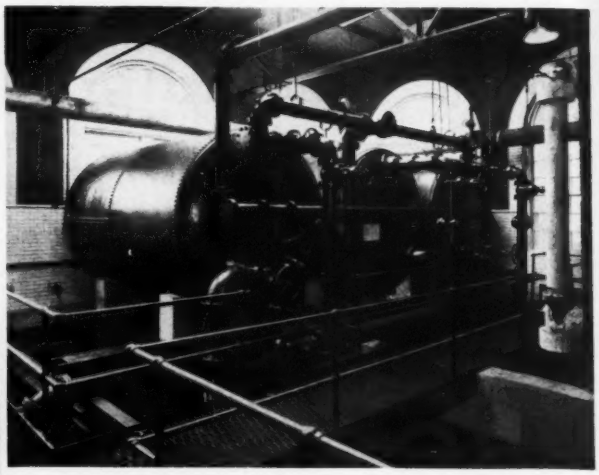
For efficient coagulation, it is necessary to maintain the pH values within a certain range, which, in general, is lower, when aluminum salts are employed, and higher, when iron salts are employed. The most commonly used

* Presented at Annual Meeting, Chattanooga, Tenn., Dec. 7, 1935.

† Sales Engineer, The Permutit Company.



Textile Mill Settling Tank Installation. Capacity—10,000,000 Gallons Per Day.



Battery of Three Horizontal Pressure Type Filters in a Textile Plant.

coagulant, sulfate of alumina, is usually employed at pH values ranging from 5 to 7.

The optimum conditions and the range for good coagulation vary with different water supplies. As a rule, surface supplies that consistently show the presence of appreciable amounts of turbidity and that possess an appreciable amount of other salts, respond to coagulation readily. Waters low in turbidity, high in color, and low in dissolved mineral content, give the greatest amount of difficulty in coagulation.

Among the aids of coagulation that have been studied and worked out recently are:

(a) The use of proper mechanical agitation.

(b) The use of inert suspended matter (added at the same time as the coagulating chemicals).

(c) Proper control of the pH value of the water.

Agitation accelerates the formation of the floc and also improves the quality of the floc itself, so that it settles more readily. The use of inert suspended matter, such as clay, provides nuclei around which the floc particles form and also helps to weight the floc and increases the rapidity of its settling.

When these aids to coagulation are provided in the case of waters that normally respond to coagulation within a very narrow pH range, it has been found that the effect of these aids to coagulation is to broaden the pH range within which good coagulation takes place. The importance of broadening the range is that it simplifies the operation of the clarification equipment. If only a very narrow range of pH value is permissible for good coagulation and if, in fact, the optimum coagulation takes place at only one pH value, the task of the operator in controlling the addition of coagulants and alkalis to obtain this very narrow range is obviously greatly increased. These aids, therefore, are of great value in obtaining good coagulation.

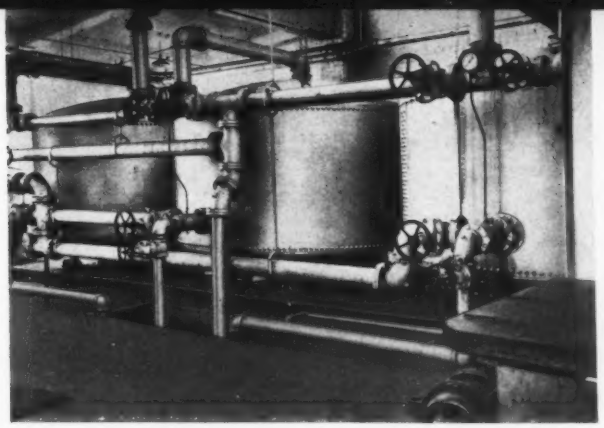
SETTLING

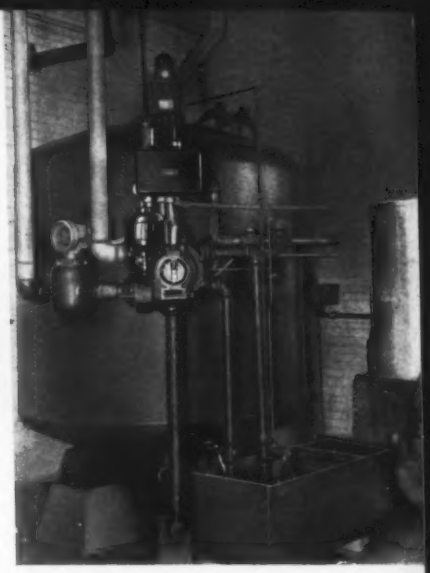
Depending on the amounts of turbidity present, the water, after coagulation may be settled first in settling tanks or basins or, if the amount of turbidity is small, the settling step may possibly be omitted and the coagulated water run directly to the filters. Where settling tanks or basins are employed, they may be made of steel, wood or concrete.

The vertical steel settling tank, which usually is above ground level, has the advantage of saving floor space and of providing, in the top of it, a gravity supply of settled water, which may be used for backwashing the filters. The horizontal flow concrete basin, however, also finds good application in many cases, where it may be used as the basement of the filter building. It has the advantage of ease of application of chemicals by gravity flow of the chemicals, rather than by pumping them.

Agitation for mixing in the chemicals is provided by mechanical paddle stirring. The speed of the agitation must be adjustable and must be kept within a certain range. Furthermore, the necessary detention period in the mixing chamber must be provided. The required detention period and speed of stirring is best determined by experiment before the equipment is designed.

The proper feeding of the coagulating chemicals is of extreme importance because of the necessity for proper pH control. The use of crude, old-fashioned feeding devices must be abandoned if production of the ideal effluent is to be had. The newer feeding devices that have been developed in the last few years usually employ electricity in connection with the operation of the feeds and are therefore known as electro-chemical feeds. This combination of electricity and hydraulics is especially adapted to precision, flexibility and accuracy, all of which are required in such clarification work. Electro-chemical feeds also lend themselves to a combination of a pH recorder and chem-





ABOVE—At right of photo are two Sand Filters; at left is an Activated Carbon Filter as used in a Textile Plant for Color Removal.

RIGHT—Fully Automatic Zeolite Water Softener Installation in a Textile Plant.

ical feed, permitting the automatic regulation of the feed to keep the effluent within the desired pH range.

A correctly designed settling tank, equipped with the proper agitator and chemical feeds, will effect an excellent coagulation and settling of suspended matter with a two hour detention period and will reduce the load on the filters to only a fraction of what it would be otherwise. Therefore, settling tanks are widely employed in clarifying textile water supplies.

COLOR REMOVAL

Highly colored waters are, of course, very undesirable in textile processing and usually, these highly colored waters are low in mineral salts and turbidity and, therefore, difficult to coagulate. With such waters, it has been found that the aids to coagulation previously enumerated are very effective in removing the color. Control of the pH value; proper agitation, at the correct rate and for the correct period of time; and the addition of an inert substance, such as clay, during the coagulation, are all necessary for efficient removal of color from such waters. With proper attention to these factors, an excellent removal of color is effected.

Another interesting method of color removal is the use of a pressure filter, filled with activated carbon. The water handled for instance, in one case, was very highly colored, low in turbidity and low in mineral content. It was coagulated with sulfate of alumina and soda ash, filtered through pressure type sand filters, then filtered through activated carbon and finally softened through a zeolite water softener. The results obtained were excellent, the effluent being clear, colorless and, of course, completely soft.

FILTRATION

After coagulation, and with or without settling as the case may, the water is next filtered through sand filters. The filters employed may be of either of the open gravity type or of the closed pressure type.

The gravity type filter shell may be constructed of wood, steel or concrete. The pressure type filter shell is constructed of steel to withstand whatever pressure it is necessary to handle.

Whichever type of filter, gravity or pressure, is employed, the filter contains a filter bed, which is composed of a layer of fine sand, resting on a layer of coarse sand, which is supported by several layers of graded gravel.

During filtration, the water is admitted and evenly distributed over the top of the filter bed by a system of troughs or perforated pipes. The water then passes downwardly through the filter bed and the filtered water is drawn off to service through an underdrain system composed of strainer heads, laterals and headers.

The filter medium most generally employed is silica sand, which is carefully selected; thoroughly washed to free it from clay, dust, etc.; and screened so as to furnish material of a uniform grain size.

The supporting layers of coarse sand and graded gravel used are also carefully selected, washed and screened to size. Generally, several layers of graded gravel are used; the largest being at the bottom and the finest at the top. The gravel serves to support the coarse layer of sand, on which the fine filter sand rests. Besides functioning as supports, the layers of gravel and coarse sand aid in maintaining a uniform distribution of the wash water, during cleansing.

No matter how turbid or highly colored the raw water supply may be, correct pretreatment and filtration will furnish a clear, clean, colorless effluent, thus eliminating the textile processing difficulties caused by an unclean or colored water supply.

WATER SOFTENING

While the above described water conditioning will correct the difficulties caused by insoluble water impurities or color, it does not reduce the hardness of the water supply and, consequently, does not eliminate the textile processing troubles caused by hardness. Also, the foregoing conditioning is usually applicable only to surface waters. Many ground waters, such as those obtained from deep wells or springs, are clear when drawn and do not require sedimentation, coagulation, settling or filtering. Nevertheless, such ground waters contain hardness, and this is generally even greater in amount than with the surface waters in the same locality.

Therefore, whether a clear well water or a filtered surface water is employed, hardness is present and should be removed in order to eliminate the many textile processing difficulties caused by the lime and magnesium salts, which constitute the hardness of a water supply. This process of hardness removal is termed "water softening" and the equipment, almost universally employed in the textile industry to carry it out is the zeolite water softener.

The Zeolite Water Softener consists of a steel shell containing a bed of granular zeolite supported by layers of graded gravel lying over an underdrain or strainer system. The water to be softened is admitted through the upper portion of the shell and uniformly distributed over the surface of the zeolite bed. It then passes evenly downward through the zeolite, during which passage the hardness forming elements—calcium and magnesium—are removed by the base-exchanging action of the zeolite. The softened water then passes through the supporting layers of graded gravel and is collected by the underdrain system, flowing to the outlet of the softener, from which it passes to the service lines.

When the water softening capacity of the zeolite bed is exhausted, the softener is taken out of service and regenerated. There are three steps in this regeneration.

The first step of the regeneration is backwashing, which is effected by passing a strong current of water upward through the softener. This loosens and regrades the zeolite bed; holds it in a semi-suspended condition; and removes by washing up and out any dirt which may have collected on top of the zeolite bed during the softening run.

The second step is the salting. This is accomplished by introducing into the softener a predetermined amount of a solution of common salt, by means of an hydraulic ejector, which is an integral part of the softener. This salt solution is uniformly distributed over the top of the zeolite bed and evenly passes down through it. As it does so, the salt reacts with the zeolite, removing the calcium and magnesium in the form of the very soluble chlorides, and, simultaneously, restoring the zeolite to its original active or sodium condition.

The third and last step in the regeneration is the salt rinse, which consists of washing the calcium and magnesium chlorides, plus the excess salt, to the drain by means of a fairly slow flow of water. After the salt rinse, the softener is returned to service.

If soft water storage sufficient to tide over this regeneration period—30 to 40 minutes—is available, a single unit plant may be used. If storage is not available, plants consisting of two or more units may be used, the other unit or units carrying the full load while one is being regenerated.

Fully automatic zeolite water softeners are now widely employed. In these, by an ingenious system of electrical controls, operating in connection with a motor-driven multiport valve, the zeolite water softener automatically regenerates itself at the end of the softening run and automatically returns itself into action thus assuring a constant supply of soft water and eliminating any possibility of incorrect operation.

Zeolite softened water is so free from hardness that it is termed "water of zero hardness" or, more commonly "zero water". When hard water is used with soap, a scummy, sticky, insoluble curd of lime and magnesia soaps is formed and this tends to stick to everything with which it comes in contact. When zeolite softened water is used with soap, no insoluble soap curds are formed, thus permitting the full cleansing action of the soap to be used and eliminating the many textile troubles caused by these insoluble lime and magnesia soaps.

When hard water is heated or used in the steam boiler, deposits, known as scale or sludge, are formed. Zeolite softened water is free from all of these scale and sludge deposits. Similarly, when various alkaline chemicals, such as caustic soda, are added to hard water, troublesome lime and magnesia deposits are formed. When zeolite softened water is used with alkalies, no deposits are formed.

Therefore, the use of zeolite softened water in the textile plant eliminates the troubles caused by hard water. Also, the savings in soap that are effected by its use are so large that a handsome return on the investment is realized. This return in clear savings, above the fixed and operating charges, averages from 30% to over 100% per year, depending on the hardness of the raw water supply and the amounts of detergents employed. In addition, the quality of the work is greatly improved.

IRON AND MANGANESE REMOVAL

Iron occurs in a number of water supplies and is exceedingly troublesome in textile processing. Manganese, fortunately, is of rarer occurrence but is even more troublesome than iron.

Since the methods used for the removal of manganese are quite similar to those used for removing iron, it is unnecessary to repeat them, so only the methods used in iron removal will be outlined. These methods depend on the form in which the iron is present.

If the supply is a surface water, the iron may be removed by coagulation with sulfate of alumina and filtration, which may or may not be preceded by settling. This method does not apply to the iron, present as ferrous bicarbonate, which is the usual form encountered in deep well waters.

Such waters may be crystal-clear, when drawn, but, upon standing in the open air, they become cloudy and deposit iron as a yellowish or reddish brown precipitate. With such waters, the iron may be removed by one of three methods:—

(a) Aeration and filtration.
(b) Treatment with manganese zeolite.
(c) The zeolite water softener.

In (a), the water is first aerated, with or without the

addition of an alkali, depending on the chemical characteristics of the water, settled for a short time and then filtered. This treatment oxidizes the soluble ferrous bicarbonate to the insoluble ferric hydroxide, which may then be settled out and the final traces removed by filtration.

In (b), a manganese zeolite is employed to act as an oxidizing contact medium, converting the iron to the insoluble ferric oxide, which is removed by the filtering action of the manganese zeolite bed. This specially prepared manganese zeolite exerts no softening action on the water.

At periodic intervals, the manganese zeolite is regenerated with a solution of permanganate of potash, which restores the oxidizing powers. Frequently, a small amount of air is pumped into the water, ahead of the manganese zeolite, and this effects economies in the use of the regenerating the material, the permanganate of potash.

In (c), the iron is removed by the zeolite softener, simultaneously with and in a similar manner to the removal of lime and magnesia. Similarly, when the zeolite is regenerated with a solution of common salt, the iron, which it has taken out of the water, is removed from the zeolite in the form of a soluble salt, which is discharged to the sewer, with the soluble lime and magnesia by-products.

This method should not be confused with that described in (b). For the zeolite water softener removes both hardness and iron, while the manganese zeolite filter removes only the iron and has no effect upon the hardness. There are a large number of zeolite water softeners thus used for softening iron-bearing water supplies and simultaneously removing the iron content, thus furnishing a clear, soft, iron-free water and eliminating the processing difficulties caused by both of these impurities.

Necessarily, the presentation of this paper has been brief, in order to fit in with the allotted time. It is to be hoped, however, that this brief glimpse will indicate how many of the troubles, waste and expensive losses experienced in the wet-processing of textiles may be eliminated by the correct conditioning of the water supply.

DISCUSSION

Chairman Draves: I am sure this paper on the medium with which we do our work is very important. I might relate an interesting experience that I had several years ago.

We had a small zeolite softener. The water was drawn from a river which is several miles from the ocean. Suddenly the zeolite softener didn't operate more than fifteen minutes before it had to be re-softened. It finally dawned upon me that the prevailing winds for several days had blown the salt water up into the softener and the zeolite softener was regenerating all the time and therefore lost its softening capacity.

I don't know what the tolerance in salt is in water that can be softened. Do you happen to know that?

Mr. Morrison: If the sodium salts are below 30 grains per gallon, which is the case with the great majority of usable water supplies, there is no noticeable effect. If the sodium salts are above 30 grains per gallon, the length of the softening run may be somewhat reduced. This is usually taken care of by using a compensated hardness figure when calculating the length of the softening run. Of course, in the interesting case you mention, conditions were very abnormal as sea-water contains such an enormous concentration of salt, about 1,600 grains per gallon or nearly 3 per cent, that it can actually be used to regenerate the zeolite.

APPLICANTS FOR MEMBERSHIP

Active

John Jefferson Adams—Foreman, Rock Hill Printing & Finishing Co., Rock Hill, S. C. Sponsors: J. H. Easley, C. Forster.

Nathan Arculis—Foreman, Rock Hill Printing & Finishing Co., Rock Hill, S. C. Sponsors: J. H. Easley, C. Forster.

Percy Clarke Blackman, Jr.—Colorist, Rock Hill Printing & Finishing Co. Sponsors: J. H. Easley, R. S. MacDougall.

William Bolivar Byers—Assistant Dyer, Rock Hill Printing & Finishing Co. Sponsors: J. H. Easley, C. Forster.

John Lawrence Dabbs—Southern Sales Manager, E. I. du Pont de Nemours & Co., Inc., Charlotte, N. C. Sponsors: P. F. Haddock, A. R. Thompson, Jr.

W. Ashton Daniel—Supt. of Dyeing, Knitting Dept., Wiscassett Mills Co., Albemarle, N. C. Sponsors: T. R. Smith, A. H. Gaede.

William Joseph Diamond—Hosiery Dyer, Chester Hosiery Finishing Co., Chester, Pa. Sponsor: A. E. Jones, Jr.

Reinhard Eck—Chemist, United Piece Dye Works, Lodi, N. J. Sponsors: Edvard Young, E. E. Gansel.

Louis D. Fleming—Foreman Dyer, Woodlawn Finishing Co., Pawtucket, R. I. Sponsors: Richard Haworth, R. F. Culver.

Irvine Walter Grote—Professor of Chemistry, University of Chattanooga. Sponsors: L. A. Olney, H. C. Chapin.

James Luther Hall—Foreman Finisher, Rock Hill Printing & Finishing Co. Sponsors: J. H. Easley, C. Forster.

James Elbert Hodge—Overseer, Fairforest Finishing Co., Spartanburg, S. C. Sponsors: D. S. Quern, C. H. Stone.

Alphons Otto Jaeger—General Manager, Selden Division, American Cyanamid & Chemical Corp., Bridgeville, Pa. Sponsors: P. F. Haddock, H. W. Rose.

Walker Myres Johnson—Foreman, Rock Hill Printing & Finishing Co. Sponsors: J. H. Easley, C. Forster.

Harold Kinder—Foreman, Print Room, Queen Dyeing Co. Sponsors: E. H. Aeckerle, R. A. Pingree.

Fred Eugene Mason—Chemical Engineer, Mount Hope Finishing Co., North Dighton, Mass. Sponsors: W. S. Williams, C. R. Ewing.

Dustin Y. Miller—Chemist, Botany Worsted Mills, Passaic, N. J. Sponsors: P. M. Otto, P. J. Kennedy.

Paul Francis Mitchell—Chemist in Charge of Dyeing, Adams & Millis Corp., Kernersville, N. C. Sponsors: K. Mackenzie, D. S. Moss.

James W. Monks—Manager and Chemist, Poughkeepsie Dyestuff Corp., Poughkeepsie, N. Y. Sponsors: L. J. Roos, V. H. Lawrence.

Henry Papini—Colorist, Rock Hill Printing & Finishing Co. Sponsors: R. S. MacDougall, J. H. Easley.

Frank Heilman Riale—Chemist, National Dyeing & Printing Co., Williamsport, Pa. Sponsors: H. E. Tillson, W. C. Robb.

Wade Montgomery Shanklin—Overseer, Pacific Mills, Lyman, S. C. Sponsors: D. S. Quern, R. E. Rupp.

Philip Strengs—Head Dyer, Strengs Dye Works, Paterson, N. J. Sponsors: C. E. Moss, S. Springer.

Harold H. Tucker—Chief Chemist and Dyer, J. Larkin & Sons, Inc., Milwaukee, Wis. Sponsors: E. F. Hempel, H. W. Tetzlaff.

Robert Barton Young—Assistant Superintendent, Fairforest Finishing Co., Spartanburg, S. C. Sponsors: D. S. Quern, C. H. Stone.

Harry Whittaker—Dyer, Hampton Co., Easthampton, Mass. Sponsors: E. H. Fuller, N. J. Wolfram.

Erwin Wilkinson—Dyer, Max Pollack & Co., Inc., Willimantic, Conn. Sponsors: W. D. Lowell, E. J. Young. Jr.

Murray W. Bulford—Superintendent, Pontiac Finishing Plant, Pontiac, R. I. Sponsors: Jos. Houth, R. F. Culver.

Junior

Marshall J. Gardner—Asst. Overseer, Bleaching, Proximity Print Works, Greensboro, N. C. Sponsor: A. H. Grimshaw.

Willard S. Gilbert—Chemist, Algonquin Printing Co., Fall River, Mass. Sponsors: T. A. McCann, A. Marsh.

William G. Hollis, Jr.—Asst. Foreman, Dyeing, Rock Hill Printing & Finishing Co. Sponsors: J. H. Easley, C. Forster.

John A. Kinnane—Chemist, Standard Knitting Mills, Knoxville, Tenn. Sponsors: L. L. Baker, H. Schroeder.

Henry Massey—Foreman, Bleaching, Rock Hill Printing & Finishing Co. Sponsors: J. H. Easley, C. Forster.

John Wayne McCalla—Foreman, Dyeing, Rock Hill Printing & Finishing Co. Sponsors: C. Forster, J. H. Easley.

Associate

Louis L. Dettelbach, Jr.—Tech. Representative, Chemist, Colgate-Palmolive-Peet Co., Atlanta, Georgia.

George W. Hinkle—Metallurgist, Republic Steel Corp., Massillon, Ohio. Sponsor: T. R. Smith.

W. C. Howe—President, The Speare Supply Co., Chicago, Ill.

Robert Thornton Neville—Treas. and General Manager, Ideal Mercerizing Co., Burlington, N. C. Sponsors: J. B. Neely, R. A. Bruce.

Herbert M. Wendle—Sales Service, Hercules Powder Co., Watertown, Mass. Sponsor: J. Hird.

Student

H. H. Latham—Student, North Carolina State College. Sponsor: A. H. Grimshaw.

Carl C. Plaster—Student, North Carolina State College. Sponsor: A. H. Grimshaw.

John James Roarke—Student, Lowell Textile Institute. Sponsor: L. A. Olney.

NINETY-SEVENTH MEETING, RESEARCH COMMITTEE

Dec. 6, 1935

THE 97th meeting of the Research Committee followed the Council meeting in the Read House, Chattanooga, on Friday afternoon, Dec. 6, 1935. Present were Chairman Louis A. Olney, presiding: W. D. Appel, B. C. Blowney, C. Z. Draves, G. H. Dubois, S. M. Edelstein, C. F. Goldthwait, A. H. Grimshaw, W. E Hadley, J. F. X. Harold, Milton Harris, H. F. Herrmann, A. P. Howes, E. C. Knaeble, C. B. Ordway, D. H. Powers, R. E. Rose, Harold Schroeder, C. H. Stone, A. R. Thompson Jr., Ben Verity, N. D. White, and H. C. Chapin. Regrets were received from E. C. Bertolet, W. H. Cady, W. R. Moorhouse, and W. M. Scott.

It was voted that reprinting of Dr. Scott's, "Analytical Methods for a Textile Laboratory", be in the Year Book rather than in separate pamphlet. The Chairman described a machine for measuring crocking, devised by Walter C. Durfee since the last Committee meeting. A list of dyes to be used as crocking standards was received from Dr. Meyer. It was announced that wool standards for washing fastness were available from the Chairman at one dollar per set.

The Chairman reported progress on plans of Mr. Hathorne's committee for the research to be financed by the Throwsters' Institute and Textile Foundation. Reports were received from Mr. Cady on progress of Printing Paste and Light Fastness Researches. Mr. Cady suggested a committee on "Creasability". Mr. Kenneth H. Barnard was asked to organize such a committee.

There was further discussion of the organization of a committee, and institution of research on the fundamental chemistry of cotton. Organization of a committee on detergents was discussed. It was suggested that the Sub-

Committee on Waterproofness of Fabrics consider also fastness to spotting. There was discussion of extension of the work on shrinkage of textiles to cover fabrics other than cotton. Professor Ordway suggested work on protection of fire hose and other textile products against termites.

Adjourning the meeting, the members of the Research Committee remained for a meeting of the Sub-Committee on Mercerizing, at which Professor Ordway presided, and Sidney M. Edelstein, our Research Associate at the University of Chattanooga, described his results to date, and plans for further work.

Respectfully submitted,

H. C. CHAPIN, *Secretary.*

Accelerated Aging Test

For Weighted Silk*

DISCUSSION

President Rose: There are a lot of questions that might be asked about that paper. I think that the interesting feature is that it shows again that when you investigate a problem quantitatively you find that what preconceived notions you had are evidently wrong. Here you have weighted silks that are supposed to be very fragile but which are actually quite as resistant as pure silk.

Has anyone any questions to ask?

E. W. Pierce: I have had some personal experience with the weighting of silk.

In the old days when the silk had first been subjected to the tin tetrachloride and then washed with water and given its phosphate, we always regarded it as an invariable rule that the phosphate must be applied for at least three-quarters of an hour. The washing must be very complete with cold water first, then finished with a little warm water. We were enabled in that way to convert the tin completely to meta-stannic acid, which was the final product, then the following phosphate treatment converted all of the tin to tin phosphate. It then went back for a second pass, later the third, and sometimes the fourth, and finally was often given a bath in silicate.

The result of the older process was to convert every bit of tin into insoluble precipitate absolutely free from any chlorine products.

If the washing is incomplete in the first case you have a little core in the center of the silk fiber which consists partly of oxychloride. You may let a pile of this silk lay for an hour or two which will have shown a perfectly neutral reaction in the first place and after several hours it will be decidedly acid.

If silk like that has been sent to the printer, when it goes through the ager the chlorine, which is present in very small amounts, is liberated as an acid product and tenders the silk.

There is another feature that has something to do with testing these fabrics; in weighting silk, the reaction which determines the set of the fiber, the set of the weave, takes place at the moment the water starts to decompose the tin tetrachloride and hydrolize it, just as in mercerizing cotton pieces, which must be at the full stretch when you begin to wash out the caustic.

If the plant that weights the silk is equipped to keep the goods at full width when the washing begins, you will have a fabric which has a much better tensile strength than if you allow it to shrink to, say, twenty-five inches. If you shrink it to twenty-five inches and precipitate all of these compounds in the silk fiber and then later in the finishing pull it out on a tenter frame to thirty-nine inches and crush it under a calender, you are going to have a more tender silk in the end than if the weighting had been performed pretty near at the normal width of the fabric.

I think that point as well as the presence of chlorine products has a great deal to do with explaining the discrepancies which were made apparent in Dr. Appel's observations.

*This paper was published in the December 16, 1935, issue. The discussion now published followed the presentation of the paper at the Annual Meeting.

BANQUET HELD AT ANNUAL MEETING, PIEDMONT SECTION, NOVEMBER 9, 1935.

AMERICAN DYESTUFF REPORTER

LOUIS A. OLNEY, Sc.D.
Professor of Chemistry and Dyeing, Lowell Textile Institute
Directing Editor

NORMAN A. JOHNSON
Managing Editor

MYRON DREW REESER
Advertising Manager

Published biweekly by
HOWES PUBLISHING CO., INC.
440 Fourth Avenue, New York City

Subscription price: $5.00 per year; Canadian $6.80; foreign $6.00

Vol. XXV January 27, 1936 No. 2

THE S. O. M. A.

ONE of the newer associations, the Sulphonated Oil Manufacturers Association, is also becoming one of the most alert which is functioning in the textile chemical and allied fields. Within a month after the invalidation of the N. R. A. this organization inaugurated a program designed to maintain satisfactory conditions of wages and hours within the industry as well as to foster fair trade practices, standardization of grades and other matters of vital concern to its members.

In order to eliminate consumer misunderstandings relative to quality the association has recently published a handbook of data related to sulfonated oils and other products of this industry. This handbook is being distributed in response to requests furnished by the individual members, copies going mainly to textile mills and leather plants, commercial laboratories, libraries, colleges and others who have a direct interest in the subject. The material contained in the handbook to date concerns itself with methods of analysis, adopted by the Association as official, and which represent the product of some of the best chemists and technicians in the country. The handbooks are numbered and a record of distribution is being maintained in order that changes as well as supplementary issues of material may be mailed to holders from time to time as issued. Copies are still available through request to members of the association but will be sent only to those persons or organizations who are directly interested in the subject.

In order to further carry out the program of the association standing committees are functioning on the following matters: laboratory, costing, quality of standards, unfair trade practices, publicity, marketing, traffic and social. The net result of the efforts of this association should result in better understanding between its members, between sellers and buyers, and a square deal all around. The members of this association are to be congratulated upon their foresight and concerted action.

● KEMP DYEING

The popular ideas that kemp is a dead wool fiber, noncellular and malformed, that it lacks scales and that it does not take dyes as well as normal wool, have been proved wrong by G. Gordon Osborne, a Fellow of the Textile Foundation, who reports his findings in the January issue of *Textile Research*. Kemp was studied by Mr. Osborne because it is the simplest of the wool fibers structurally, and best adapted for the development of techniques needed for the study of the more complicated fibers, and not because of any idea that the study might prove kemp to be a valuable fiber. The author's findings are summarized as follows:

The recent work on the actual structure of kemp has proven the following: First, that there is a definite scale formation on the surface of the fiber completely encasing it. In all respects this is similar to wool. In themselves, however, the scales are smoother in surface and less jagged in edge; they are less prominent in their projection from the fiber, both in length and angle; nor do they overlap to the extent common in wool.

Second, in cross-section the fiber is strikingly different. Scale and outer casing are the same; the interior of the fiber, however, is just the reverse of normal wool. In kemp the cortical layer is extremely small, whereas in wool it forms the major portion of the fiber. In both, this layer appears as a homogeneous mass, though in reality it is formed by myriads of tightly-packed and closely-cemented spindle cells. In some wools a fine medulla forms a core through the center of the cortex.

Third, it is this medulla that comprises the major part of, and is the distinguishing aspect of a kemp fiber. It is cellular in composition, the cells being spaced without break throughout the fiber. They are irregular in size and outline and are arranged in similar order to the cells in a honey-comb. This medulla in true kemp is the product of a special group of cells in the root (is annular in growth) and therefore can scarcely be considered an abnormality.

The much greater reflection from kemp (due to the air-filled medulla) is the cause of the difference observed after dyeing. In reality, however, it has been shown by removing the air that kemp and wool are almost equally dyed; penetration and affinity being very similar.

● STUDENTS' STYLE SHOW

Thomas Nelson, Dean of the Textile School, University of N. C., stated recently that ten North Carolina colleges have already accepted the invitation of the Textile School to participate in its annual Style Show which will be held in Pullen Hall on Thursday, April 23. There is a possibility that one or two more colleges will also accept the invitation.

Colleges which have expressed their intention of cooperating with the Textile School this year are: Meredith, Saint Mary's, Peace, Woman's College of the University

of North Carolina, Queens-Chicora, Salem, Flora Macdonald, Elon, Catawba, and Louisburg.

So great has been the interest in this annual event that it has been found necessary to limit the number of entrants from the larger institutions to twenty.

—— ♦ ——

● COLUMBIA UNIVERSITY TEXTILE COURSES

Columbia University, Evening Textile Courses, announces that the spring term commences on January 30th; registration for all courses takes place in the office of the Registrar, Room 315, University Hall. Instructors may be personally interviewed in Room 401, School of Business, any evening beginning on January 30th.

The following courses will be offered in the spring term on textile subjects:—

Cotton Goods Converting.
Rayon Goods Converting.
Woven and Printed Design.
Silk Goods Converting.

All courses begin on or after February 5th and consist of fifteen lectures each. They are given from 7:30 to 9:20 P. M. on various evenings enabling a student to take more than one course, if desired. The usual fee of twenty dollars and five for registration is required. The courses are given for the benefit of all interested in textiles in the New York market. These courses have been given continuously for the last fifteen years.

Herbert R. Mauersberger, head of the department, announces that arrangements are being made for the reinstatement of a course in woolens and worsteds beginning next fall and given by one of the most outstanding authorities in that field.

—— ♦ ——

● GENERAL RELEASE

General Dyestuff Corp. announces release of the following product:

Celliton Fast Blue FFB—said to possess a very clear shade and excellent leveling properties with the advantage of dyeing evenly with yellows and reds or other Celliton colors from any length of liquor.

—— ♦ ——

● DU PONT DYES

Four new products have just been announced by the Dyestuffs Division of E. I. du Pont de Nemours & Company:

"Luxol" Brilliant Green BL (Patented)—a new spirit soluble color which yields bright bluish shades of green in all types of spirit printing inks. It is said to possess excellent solubility in alcohol and, in addition, is fast to light and exhibits good tinctorial strength. It is expected that Luxol Brilliant Green BL will find use wherever a quickly drying, bright printing ink of bluish green shade is desired.

"Diagen" Black DM (Patented)—a straight azoic black to be used alone for greenish shades of black or in conjunction with other colors of this type. It is expected to be particularly useful for shading blues to obtain dark navies and as a shading component for browns. It is said to exhibit satisfactory fastness to light and to soaping at the boil for one-half hour, and it is claimed that it should be widely employed on the less expensive types of cotton goods because of its desirable shade and good application properties.

"Avirol" OS and *"Avirol" WS* (Patent applied for)—new emulsifying agents, said to be suitable for a wide variety of uses. The former is an oil-soluble compound whereas the latter is wax-soluble. Both products are described as being entirely stable to atmospheric oxidation. It is also stated that they will not become rancid, and that they exhibit excellent working properties. "Avirol" OS may be used for preparing emulsions of animal, vegetable and mineral oils, and "Avirol" WS adapts itself to the emulsification of paraffin wax, animal waxes such as beeswax and spermaceti, and vegetable waxes such as carnauba and Japan wax.

"Luxol," "Diagen" and "Avirol" are registered trademarks of E. I. du Pont de Nemours & Company.

—— ♦ ——

Book Review

Silk and Rayon Directory and Buyers' Guide of Great Britain 1935-1936. Published by the Harlequin Press Company Ltd., Old Colony House, South King Street, Manchester, England. Pages 371. Price 21 shillings net.

This publication presents a very complete directory of all concerns in Great Britain engaged in the manufacture of rayon yarn and in the weaving and processing of silk and rayon fabrics. It also gives a directory of the rayon producers of the world classifying them according to the different types of rayon and according to different countries.

Approximately one-third of the book, 120 pages, is devoted to a geographical classification of the different British concerns, another approximate third of the book is devoted to a buyers' guide, which is classified according to rayon materials, processes, yarns, knitted and woven fabrics, machines and appliances, chemicals and dyestuffs. In addition there is included the silk and rayon tariffs of the world, also, the various trade houses and organizations interested in the silk and rayon industry. An appendix gives the statistics in a tabulated form of rayon and silk prices, rayon products, rayon and silk consumption and the high and low quantities of share prices of rayon over periods ranging from twenty to fifty years. It is interesting to note that in the United States of America, twenty-two different concerns are listed as manufacturing rayon in amounts varying from 1,000,000 pounds up to 100,000,000 pounds.

Spun Silk—

(*Continued from page* 30)

SPINNING, TWISTING AND SINGEING

After the cleaned and dressed silk is properly drafted and arranged in laps of uniform size it is brought to another machine where each lap is separated, rolled and twisted into slivers that look like silk ropes. The slivers are put through a process of combing, drawing, slubbing and roving by which they are pulled, twisted and retwisted to make them firmer and stronger and finally are wound on large spools ready for the spinning proper where the thread is given the desired size, twist and strength.

After the thread has been pulled and spun to the desired fineness and given the required twist it is paired for a two-ply or three ends are twisted together for a three-ply yarn according to use.

Before it is finished the yarn is gassed to remove all fuzziness, loose and broken fibrils to increase the luster of the yarn. This is done by passing the threads over the flames of lighted gas jets or red-hot electric burners, which singe all superfluous fibers leaving a round, pearly thread with the brilliance and beauty of well made spun silk. A visit to the gassing room, whether on business bent or for a friendly chat with the foreman, always reminded me of the night before Thanksgiving or Christmas eve, for the peculiar smell emanating there. "The odor of singed turkeys."

DYEING SPUN SILK

Spun silk having the same affinity for dyestuffs as reeled silk, is dyed exactly the same way and with the same dyestuffs. There are however certain precautions to be taken in dyeing spun silk which if disregarded will unfavorably influence the appearance of the finished product.

Being already de-gummed that operation is omitted when dyeing spun silk by itself. For medium and dark shades it is only necessary to wet the material thoroughly before putting the dyes on and this can be done in the dye bath before adding the dyestuffs. For pale shades and bleaching, the spun silk must be washed to remove the effect of the gassing. A few turns in a warm bath with 2 per cent soap or a little ammonia will easily and completely remove all traces of the singeing and the yarn is ready for dyeing or bleaching as the case may be.

Bleaching is best done with the peroxides of sodium or hydrogen, but the fumes of sulfur dioxide can be used successfully and bleaching with potassium permanganate and sulfurous acid will give excellent results.

Dyeing must be done speedily and with as little agitation as possible. Prolonged boiling must be avoided or the broken fibrils will arise more and more, as the dyeing proceeds, making the thread look fuzzy, stringy and impairing the luster of the thread.

Fig. 10—Comber.

To spun silk fabrics can be imparted the highest silky scroop or the softest velvety feel. They can also be made easily and effectively water-proof with a solution of aluminum sulfate. Dry silk is well known for its insulating property, therefore spun silk is extensively used for covering electric wires.

Fig. 11—Drawing Machine.

Much spun silk is dyed with the fastest colors, resisted and double resisted to be used for decorating silk, wool and other fabrics that have to be processed further, boiled off, scoured, laundered or cross-dyed.

Being non inflammable, spun silk is now used exclusively for weaving the cloth that is used for filling the explosive charges for artillery purposes. The silk containers prevent the premature explosions that occurred when loading big guns with cotton filled bags, which frequently left behind some burning sparks.

Having described briefly what enters into the preliminary treatment of silk and waste and the method of producing spun silk for the benefit of the uninitiated it is to be hoped that my friend, of whom I spoke at the beginning, and others will be convinced that spun silk is as pure a fiber as the reeled cocoon silk or wool and cotton and just as reliable, if not more so, when one attempts to dye it. In the textile field and elsewhere it fills a large place. (The illustrating of this article has been made possible through the courtesy of Philip Cheney, Cheney Brothers, South Manchester, Conn.)

—— ♦ ——

● NICKEL CLAD STEEL

A new bulletin on the fabrication of nickel clad steel has recently been issued by the Lukens Steel Co. It is stated that all the data accumulated over the past five years on approved methods of fabricating nickel-clad steel has been included. Copies of this bulletin are available upon request.

—— ♦ ——

● REPUBLIC STEEL MOVES

Announcement has been made of the removal on January 25th of the offices of the Republic Steel Corp. from Youngstown, Ohio to Cleveland, Ohio. The move consolidates the offices which were located in Youngstown, the executive and Cleveland district offices formerly in Cleveland and the advertising department formerly in Massillon, Ohio. The sales offices of the alloy steel division will remain in Massillon.

—— ♦ ——

● HOUGHTO-SIZE A. C.

Announcement has been made of the development of a new sizing material for acetate and other synthetic warp yarns, to be known as Houghto-Size A. C., by E. F. Houghton & Co. It is stated that this size is a buff-colored, granular powder, possessing a moist feel, due to the various oils, penetrants and softeners incorporated in it. It is claimed that it is soluble in hot water but should not be heated to more than 180° F.; contains no starches, gums or dextrines; is extremely easy to boil-off; has a high concentration. A bulletin is available which further describes the advantages and applications of this size.

● HERCULES CHANGES

Announcement has been made of the following personnel changes in the Hercules Powder Co.; George C. O'Brien, transferred from Wilmington office to New York office, and will continue his work in the naval stores department; Paul Mayfield, manager of naval stores department at Chicago will handle Mr. O'Brien's former duties at Wilmington; G. Fred Hogg succeeds Mr. Mayfield at Chicago.

—— ♦ ——

● HAAS-MILLER CORP.

Harry L. Miller, formerly vice-president and technical director of the Quaker Chemical Products Corp. has resigned that position and formed the Haas-Miller Corp. at 4th and Bristol Sts., Philadelphia, Pa. Mr. Miller will continue to manufacture textile oil products and will specialize in chemical finishing.

—— ♦ ——

● ECLIPSE COLORS

Geigy Company, Inc. has recently released a shade card concerned with Eclipse colors, commonly known as sulfur dyes. It is stated that these colors give to the cotton dyer a very economical group of dyestuffs which are applicable to cotton yarn, raw stock or piece goods, especially where the demand is for excellent fastness to washing, perspiration, cross dyeing, etc. It is further stated that the majority of these dyestuffs do not require aftertreatment, but with many it assists in developing the fullest shade and brings out the extreme fastness of the color. Dyeing instructions are given and many samples of dyeings are illustrated.

CLASSIFIED

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

POSITION WANTED—Dyer—expert rayon and acetate lining all branches piece goods dyeing. 25 years' practical experience desires position. Write Box No. 886, American Dyestuff Reporter.

POSITION WANTED—Dyestuff salesman desires position traveling, preferably in New England. Twelve years in the business and wishes to make connection with a concern manufacturing vats and naphtols. Applicant has a well rounded knowledge of all phases of dyestuff merchandising. For interview address Box No. 888, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

V
2152
A
I